NO MORE BUGS!

$2.50

hardcore

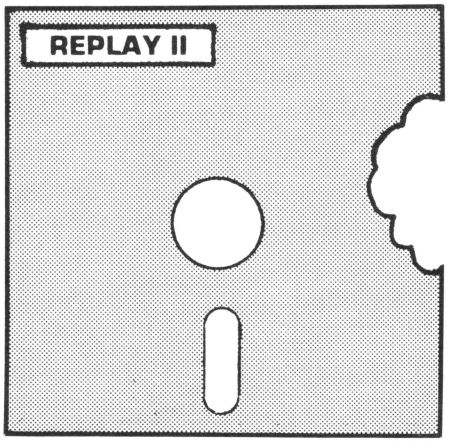
for the serious Apple-user and hard-core computist 1

NEW

REPLAY II

APPLE PROGRAM COPY SYSTEM

- **Disk Formatting Irrelevant**
- **Does not interfere with other cards**
- **Menu driven**
- **Card is transparent until copy desired.**
- **Copy *and* restart in under 15 seconds**
- **Will copy all 64k with *no* compression**
- **Copies total load programs**



MICRO ANALYST, INC.

REPLAY II is an interface card that is slot independent. Users can stop the program, examine and change memory, then restart without changing disks. Control of the system is obtained by pressing the remote switch which comes on an 18 inch cord outside the Apple*. If a copy is desired a blank disk is inserted in Drive 1 and the copy option is selected from the menu. **REPLAY II** does not copy the disk, rather it copies the program executing in memory.

REPLAY II does not change ANY memory - unlike other copy cards. It faithfully reproduces the lower 48k of memory in a fast load format. The upper 16k of memory can also be copied for a 64k copy. Standard DOS 3.3 files can be created for storage on hard disk, although the RAM card is needed.

REPLAY II can move protected APPLESOFT programs to standard DOS 3.3 disk automatically.

Utility programs supplied with the **REPLAY II** card include Program Analysis, Packing, and Compression. A language card is not needed to run packed programs. Because most programs are written in Assembly language, the user should be familiar with Assembly in order to fully utilize the Analysis and Packing programs.

NOW game player can save a game at ANY LEVEL and QUICKLY restart it with the **REPLAY II** card.

AT LAST!!! A full sized card with full sized capabilities!!!

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VISA/MASTERCARD Accepted!!

REPLAY II is intended for archival backup purposes only.

*Apple is a registered trademark for Apple Computers Inc.

hardcore

for the serious Apple-user and hard-core **computist 1**

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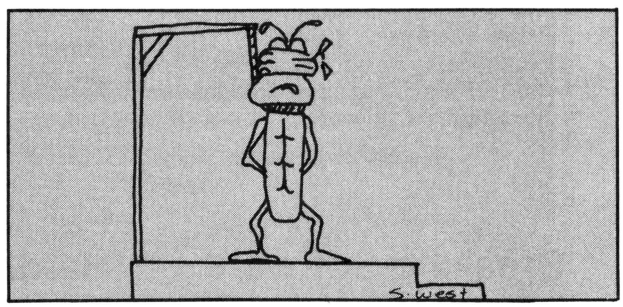

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INPUT INPUT INPUT

Fed Up Down Under

The whole business of copy-protection sickens me—I resent being treated like a child and told I can only look and not touch! (All my CP/M programs which are all much more expensive, or average, than Apple 6502 programs, have not one bit of copy-protection!) Consequently, even though I am not a reseller of "pirated" programs, I do like to have backups and so have copied now most of my software (which runs to more than 300 diskfuls, some even D/S). Even Locksmith seems to be back-pedalling a little and not supplying parm changes on some programs anymore.

Dr. Leigh Rowan-Kelly
Australia

Breaking Software Wastes Time

Keep up the good work! Although protection may be justified for games, I feel that the use of copy-protection for serious applications has greatly damaged the usefulness of the Apple as a business machine. Having had much experience in running critical medical applications (on large mini s) I could not tolerate becoming dependent on software which I could not back up to the extent that I (or my auditors) felt adequate. This always exceeds the "1 backup per user" currently allowed by the vendors of protected program packages. While my use of the Apple is currently mainly recreational, my biases carry over from the "real world" systems. As I become more involved in Apple applications, I begin to resent the time I must spend to "break" the software that I have already spent good money to own. CP/M packages now appear more attractive, because they are not protected (WHY???). I am seriously considering buying a data base program; and will probably choose dBASE over DBmaster because (among other things) dBASE can be backed up.

Mitchell Pilot, M.D.
Atlanta, GA

Pac-Man Clones Hardly "Grand Piracy"

I must take exception to your "Grand Piracy" editorial ***[HARDCORE COMPUTING #3].*** Nothing could have missed the mark more. Now I'm no expert on copyright law, but I cannot see where Atari's copyright is being infringed by anyone publishing a Pac Man look-alike.

Are we to assume that all Whatsit-Calc spreadsheet programs are a ripoff of someone else's? And what about all those screen oriented text editors that all do more-or-less the same thing on all those different machines? If the Atari precedent stands, a lot of people are in BIG trouble.

You want Grand Piracy? Copy someone else's ROM and put it in your Z-80 card or Apple-compatible computer. There's Grand Piracy. Run off copies of someone else's copyrighted program and sell them. There's Grand Piracy. But to see a game and then write your own version of it? Sorry, that doesn't qualify in my book.

Unless I'm mistaken, even in board games the same board cannot be copyrighted. The name may be a trademark but neither the playing pieces (dots? ghosts?) nor the board (a maze?) can be protected by a copyright. Only the rules of play can be copyright protected. So how does Atari get away with claiming copyright protection for their "images"? They can pull off pretty much anything they want as long as practically no one can afford to muster a battalion of attorneys to do battle against Warner Communications in court. Let's face it, most anyone else would be outgunned.

Even if everything does come out in Atari's favor, have they really gained anything? As an Apple owner, I'm not about to go out and buy either an Atari video game or computer just to play Pac Man. I suppose they might come

continued on page 25

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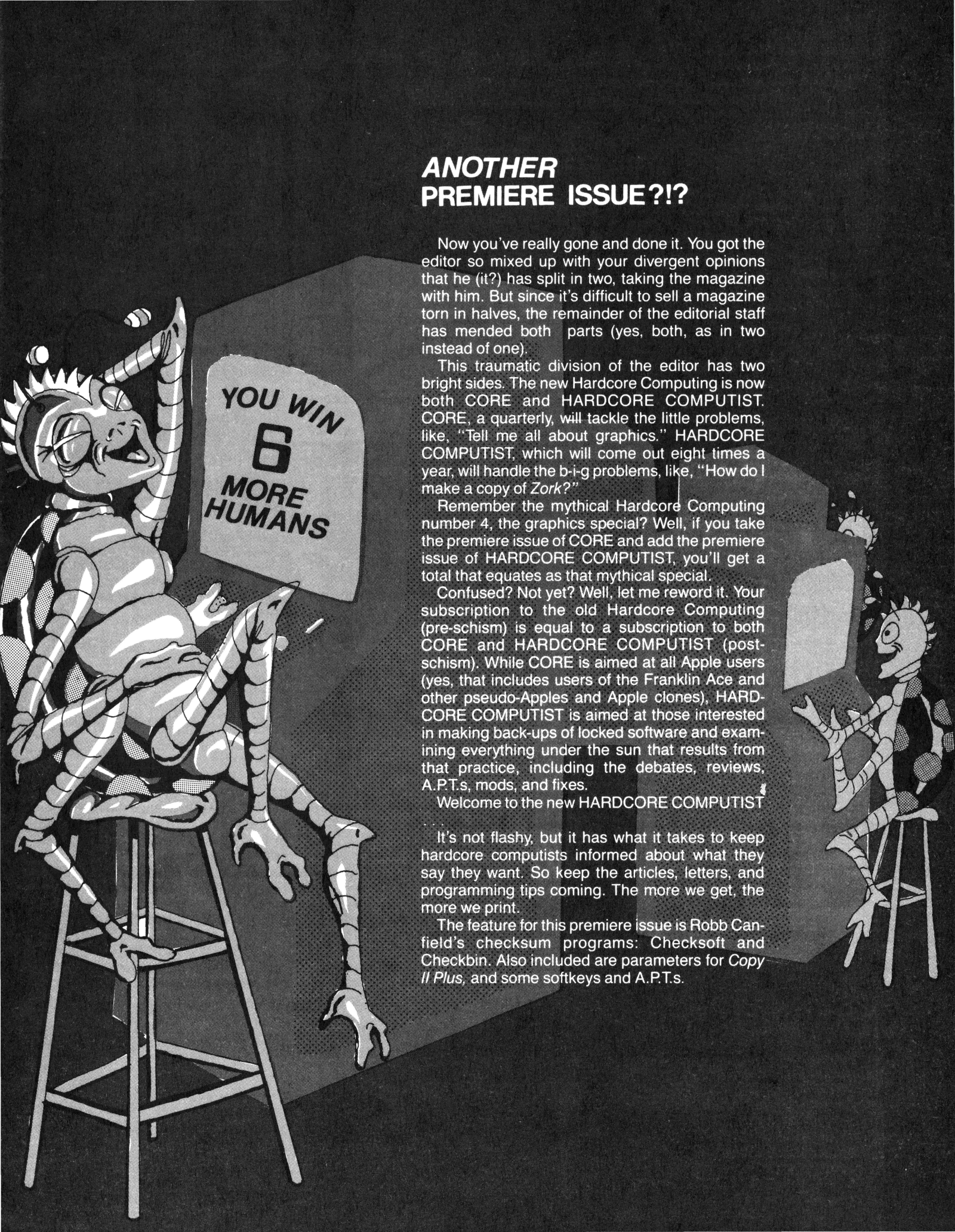
Apple usually refers to the Apple II or II Plus computer and is a trademark of Apple Computers, Inc.



ANOTHER PREMIERE ISSUE?!?

Now you've really gone and done it. You got the editor so mixed up with your divergent opinions that he (it?) has split in two, taking the magazine with him. But since it's difficult to sell a magazine torn in halves, the remainder of the editorial staff has mended both parts (yes, both, as in two instead of one).

This traumatic division of the editor has two bright sides. The new Hardcore Computing is now both CORE and HARDCORE COMPUTIST. CORE, a quarterly, will tackle the little problems, like, "Tell me all about graphics." HARDCORE COMPUTIST, which will come out eight times a year, will handle the b-i-g problems, like, "How do I make a copy of *Zork?*"

Remember the mythical Hardcore Computing number 4, the graphics special? Well, if you take the premiere issue of CORE and add the premiere issue of HARDCORE COMPUTIST, you'll get a total that equates as that mythical special.

Confused? Not yet? Well, let me reword it. Your subscription to the old Hardcore Computing (pre-schism) is equal to a subscription to both CORE and HARDCORE COMPUTIST (post-schism). While CORE is aimed at all Apple users (yes, that includes users of the Franklin Ace and other pseudo-Apples and Apple clones), HARDCORE COMPUTIST is aimed at those interested in making back-ups of locked software and examining everything under the sun that results from that practice, including the debates, reviews, A.P.T.s, mods, and fixes.

Welcome to the new HARDCORE COMPUTIST . . .

It's not flashy, but it has what it takes to keep hardcore computists informed about what they say they want. So keep the articles, letters, and programming tips coming. The more we get, the more we print.

The feature for this premiere issue is Robb Canfield's checksum programs: Checksoft and Checkbin. Also included are parameters for *Copy II Plus,* and some softkeys and A.P.T.s.

SOFTKEYS

SOFTKEY FOR

Data Reporter

NOTE: Softkey Publishing was unable to test the authenticity of this Softkey. Reader response is encouraged.

by Don Halley

Data Reporter,
Synergistic Software,
5221 120th Avenue S.E.,
Bellevue, Washington 98006,
(206) 226-3216, **$220.00**

The Data Reporter, from Synergistic Software, is advertised as Version 2 of the popular modifiable data base system. It is basically a data storage and retrieval system with graph plotting capabilities, a text editor, and many data management features.

It is offered at a suggested retail price of $220.00. There is a $5.00 charge for a back-up disk.

Documentation is fairly complete, although it suffers from the same unimaginative approach to organization as does the documentation for its competitors. There is no index, and the table of contents offers no help beyond one- or two-word references to program features. A tutorial section would be appreciated by the uninitiated user, and a reference table containing pointers to key sections would help.

Normal Copy

The documentation suggests that a copy of the original disk be made for general use, in order to prolong the original's life. The COPYA program on the DOS System Master may be used, but it will encounter a read error on the last track. This track has been written with a modified DOS, and its contents are read into memory via a short machine language program appended to the last line of the HELLO program. This means that you must always boot from the original, then swap to your application disk for processing.

Unprotected Copy

That is, only if you want to. A little PEEKing around will reveal that the protected sectors are from $00 to $06 on track $22, and that the information contained there is loaded into memory from $9400 to $9AFF. Examination of the HELLO program shows that it does not touch this area upon exit.

This means that both a way of reading the protected portion of the disk into the proper memory locations (HELLO) and a clean exit have been provided.

Try the following sequence:

1. RUN COPYA to create a copy of the original disk. (Remember to ignore the read error.)
2. RUN the HELLO program on the original disk.
3. Choose the QUIT option from the primary menu.
4. Replace the original disk with your copy.
5. Issue these commands:

```
BSAVE HELLO.OBJ,
  A$9400,L$06FF
LOCK HELLO.OBJ
UNLOCK HELLO
63999 PRINT D$;
"BLOAD HELLO.OBJ" : RETURN
SAVE HELLO
LOCK HELLO
PR#6
```

You now have a fully operational back-up, for only the cost of the disk itself. Of course, you may make as many additional back-ups as you like from this disk.

SOFTKEY FOR

Multiplan

by Bobby

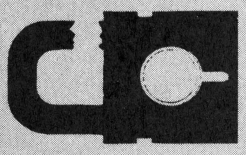
Multiplan, Microsoft Corporation,
10700 Northup Way,
Bellevue, Washington 98004
$275.00

REQUIREMENTS:
The Multiplan disk
The IOB program from Issue 3 of ***Hardcore Computing***
or IOB+ from ***Hardcore Computing Update 3.1*** (for single drive users)

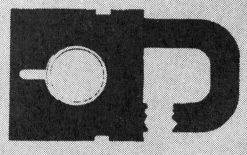
Multiplan is an excellent spreadsheet program by Microsoft. It includes an unusually complete manual with a reference guide, and an auto-help mode from within the program. Multiplan allows one and only one back-up to be made, which I found to be an insufficient guarantee (three is my minimum back-up policy for commercial software).

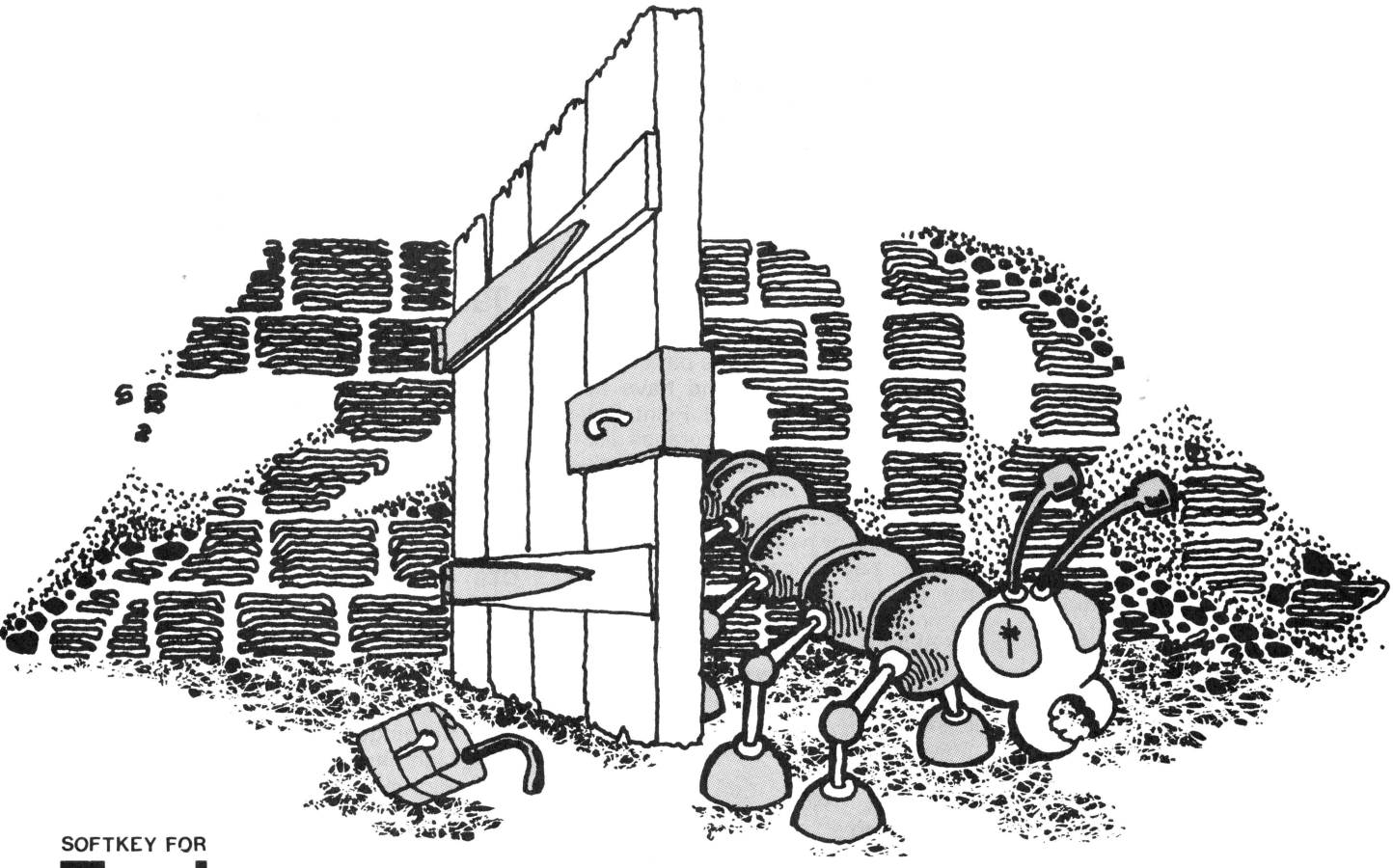
The program is only protected on tracks zero through four. The protection scheme is to change the end of the address mark on those tracks from 0E to CB. To allow the Multiplan DOS to read the unprotected disk, a mod must be done to track 0, sector A, changing byte D from CB to DE. This mod is automatically done by the IOB program.

Copy Multiplan by using the IOB program and the controller listed below. The IOB copy of Multiplan can then be duplicated with COPYA, or any number of other copy programs.



Hardcore Computist invites our readers to submit Softkeys (methods of unlocking programs) for a Reader's Softkey Exchange to begin in HARDCORE #3. Softkey Publishing will be unable to authenticate every submission, although we will test as many as possible.





SOFTKEY FOR

Zork

by Bobby

Zork, Infocom, Inc.,
55 Wheeler Street
Cambridge, MA 02138
$39.95

REQUIREMENTS:
An Apple II
At least one disk drive
A copy of Zork
COPYA
A disk editing program, such as DiskEdit

Zork is a challenging adventure game from Insoft. Although a hi-res picture is lacking (since it is a text game), Zork is one of the best adventure games I have ever attempted to solve.

While trying to solve some of the puzzles, I started to do a little APT and found that Zork was on a protected disk. I set it aside until I had the time to examine the program. Then a reader called, explaining a way to unprotect Zork. Believe it or not, the COPYA program on the system master disk can be used.

How to Copy Zork

This copy method works on Zork versions I, II, and III.

1. Boot the 3.3 master disk.

PR#6

2. Run COPYA
3. Once it is in memory, press ctrl C to halt the program.
4. Delete line 70. This stops the program from reloading a machine language routine each time it is run.
5. Drop into the monitor.

CALL -151

6. Create the following modes.

B925:18 60	Kill end of data marks.
B988:18 60	Kill end of address marks.
BE48:18	Clear errors.
B8FB:29 00	Kill last byte of beginning of data mark.

7. Return to Applesoft.

3D0G

8. Run the program.

RUN

9. After the copy is done, reboot the disk with the 3.3 master.
10. Run your disk editing program.
11. Read track 0, sector 2.
12. Modify the following values:

Change location:

5D from BC to AD

FB from C9 to 29

FC from BC to 00

You now have an unprotected version of Zork. It can be duplicated by any of the numerous copy programs available, even COPYA, without the use of modes. The disk cannot be cataloged, nor may separate files be run; it must be booted to play the game. But Zork is now open to inspection by those wishing to participate in the rapidly growing hobby of APT.

PARAMETERS

Copy II Plus, Central Point Software P.O. Box 10730, #203, Portland, Oregon 97219, (503) 244-5782 **$39.95.**

The following is a list of parameters to change in order to back up certain pieces of software with **Copy II Plus version 4.1.** To the right of the program name is the abbreviated name of the publisher. For a complete list of the publishers, please see the table on this page.

When making a back-up, be sure to follow the steps in order. Often a parameter will not be relisted if it is set for a prior range of tracks.

To back up a program, first find its name in the list of parameters. Directly below the name is a list of the tracks to copy and parameters to change. If the word BY is used, set the increment to the value that follows it. Use the default increment of one if no other figure is given.

When the word SECTMOD appears, it means that a sector should be changed using the Track Sector-Editor. Be sure to patch the read/write routines if the listing shows PATCHED and to use the correct DOS (3.2 or 3.3). Place the destination disk in drive one, then perform the changes listed.

The command format is:

SECTMOD {F=n, C=n, S=n, T=n}
DOS 3.n PATCHED
CHANGE ADDRESS A1 FROM A2 TO A3

The meaning of F, C, S, T and A1, A2, A3 are explained below:

- **F** **Disk format to be used. The value (n) will be either 13 or 16.**
- **C** **Toggle. The value (n) will be either on or off.**
- **S** **Sector to be read.**
- **T** **Track to be read.**
- **A1** **Location to be changed in the buffer.**
- **A2** **Old value.**
- **A3** **New value.**

The middle line from the example gives the DOS (3.2 or 3.3) patched.

Some diskettes can be duplicated using the default parameters (select the Bit Copy option from the main menu). If the diskette you wish to back up is not listed, try the default settings anyway.

An asterisk (*) next to the product name indicates that these parameters were user-submitted and have not been verified by Central Point Software. Central Point encourages customers to let them know when they back up a disk not on this list. This information is made available to all Copy II Plus owners.

If you have access to The Source, the command to type out the most recent parameter list is
TY SFILES>ST2008>PARAMS

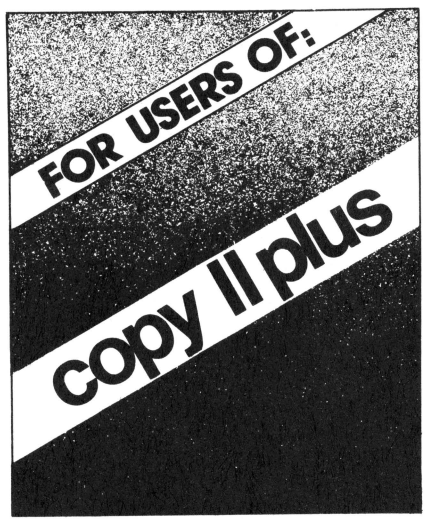


Table of Abbreviations of Publishers

AC	**Apple Computer**
AI	**Adventure International**
ART	**ARTSCI**
AST	**Applied Software Technology**
BC	**Budgeco**
BS	**Broderbund Software**
CC	**Cavalier Computer**
CTS	**Continental Software**
DM	**Data Most**
EW	**Edu-Ware**
HN	**Hayden**
ISM	**ISM**
KL	**Krell**
KN	**Kensington**
LNS	**Lightning Software**
MIS	**Microsoft**
MU	**Muse**
PBS	**Personal Business Systems**
PDS	**Picadilly Software**
SEN	**Sensible Software**
SL	**Sub Logic**
SOL	**Sierra On-Line**
SPC	**Software Publishing Corp.**
SRS	**Sirius Software**
SVS	**Silicon Valley Software**
SW	**Stoneware**
TKS	**Turnkey Software**
UNK	**Unknown**
USA	**USA**
VCP	**Visicorp**

Parameters for Copy II Plus

ALIEN RAIN * (BS)

```
  0-5.............9=0, 31=0, D=D5,
                  F=0
  6-D.............E=DE
```

APPLE ADVENTURE * (UNK)

```
  0-22............D=1, 10=96, 24=96
```

APPLE LOGO * (AC)

```
  0-22
  1...............A=1, 4B=1, 50=1
                  (ERROR 6 OK)
```

APPLE PANIC * (BS)

```
  0-D
```

```
APPLE WORLD * (USA)
  Ø-23

APPLEWRITER II (AC)
  Ø-22.............1Ø=96

APPLEWRITER /// (AC)
  Ø-22.............D=1, 1Ø=96, 24=96

A2-PB1 (PINBALL) (SL)
  Ø.................1Ø=96
  1-15.............A=3, E=DB, F=AB,
                   1Ø=BF, 44=1, 45=D,
                   46=F

AZTEC * (DM)
  Ø-22.............D=1, 1Ø=96, 24=96

BACK-IT-UP II * (SEN)
  Ø.................1Ø=96, 9=Ø
  1.5-B.5..........1Ø=B5, A=3

BEER RUN (SRS)
  Ø.................9=Ø
  1.5-D.5..........D=1, 3B=4Ø

CANNONBALL BLITZ * (SOL)
  Ø-22
  3-F..............3B=1, A=1, 4B=1,
                   4D=8, 5Ø=1
                   (ERROR 6 OK)

CANNONBALL BLITZ (alternate)
  Ø-22.............1Ø=96
       SECTMOD [S=E, T=17>
       DOS 3.3 PATCHED
       CHANGE ADDRESS CD FROM
          49 TO 6Ø

CASTLE WOLFENSTEIN (MU)
  Ø-22.............D=1

CEILING ZERO * (TKS)
  Ø-2
  3-11.............9=Ø, E=D6, 1C=D6,
                   34=1, 38=F9, 4F=1

CHESS 7.Ø * (OD)
  Ø-22.............1Ø=96, 9=Ø

CHOPLIFTER (BS)
  Ø.................A=3, 44=1, 45=D,
                   9=Ø, Ø=F, 5Ø=3
  1-8..............4=FD, 31=Ø, 43=Ø,
                   45=1Ø, 4F=1, 46=12
  9.................45=8, 46=D
  A-B..............45=2
```

We HATE to think of you typing in all the programs in CORE and HARDCORE!

A disk with the programs contained in HARDCORE COMPUTIST #1 and #2 and in the first issue of CORE is available from Softkey Publishing for only

$19.95

(postage and handling complimentary)

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Spring 1983 CORE {Graphics issue}:

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Quick Draw	Faster Shapes
QD.Editor	Space Raid

Hardcore Computist #1:

Checksoft	Checkbin

Hardcore Computist #2:

Page Flipper	Wall Draw

DISK CONTROL . . . . . $18.00_____

DiskEdit	Menu
DiskView	I.O.B.
SpeedDOS	

NAME_____

ADDRESS_____

CITY_____STATE_____ZIP_____

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Tacoma, WA 98444

(advertisement)

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DETAILS: SPARKEE REQUIRES A 48K APPLE WITH DISK DRIVE. SPARKEE AND FIRE ORGAN ARE WRITTEN IN THE LANGUAGE OF CEEMAC. FIRE ORGAN, SPARKEE, CEEMAC AND THE FIRE ORGAN LOGO ARE ALL (TM) OF VAGABONDO ENTERPRISES.

SPARKEE IS NOT COPY-PROTECTED.

```
  C-1E.5 BY.5....45=8, 10=D4, 51=1,
                 D=1
  20.............45=6, D=0, 4F=0
NOTE: Choplifter, Serpentine,
    David's Midnight Magic and
    Starblazer use track arcing
    and are very sensitive to
    drive speed. If you have
    problems, try reversing drives.
```

COLOSSAL CAVE ADVENTURE * (AC)

```
  0-22
```

CRANSTON MANOR (SOL)

```
  0-22
  18.............3B=1, A=1, 4B=1,
                 4D=8, 50=1
                 (ERROR 6 OK)
```

CROSSFIRE (SOL)

```
  0-B............9=0
  1..............3B=1, A=1, 4B=1,
                 4D=8, 50=1
                 (ERROR 6 OK)
```

DAVID'S MIDNIGHT MAGIC (BS)

```
  0..............A=3, 44=1, 45=D,
                 9=0, 0=F, 50=3
  1-A............44=0
  B..............44=1, 31=0, 43=0,
                 45=8
  C-19 BY .5.....10=F5, F=FD, 51=1,
                 4F=1, D=1
  See notes for Choplifter.
```

DB MASTER (SW)

```
  0-5............10=96, 24=96, D=1
  6.5-22.5.......D=0
```

DISK ORGANIZER * (SEN)

```
  0
  1..............3B=1, A=1, 4B=1,
                 4D=8, 50=1
                 (ERROR 6 OK)
  2-4............D=1
  A-B
```

DESKTOP PLAN II (VCP)

```
  0-22...........10=96, 34=1, 36=2A
```

ESCAPE (SL)

```
  0-22
```

EXECUTIVE SECRETARY * (PBS)

```
  0-22...........9=0, 8=1, 10=96
```

EXPEDITOR (SOL)

```
Ø-22.............1Ø=96
3 & 1F...........3B=1, A=1, 4B=1,
                 4D=8, 5Ø=1
                 (ERROR 6 OK)
```

FORMAT II * (KN)

Use Copy Disk from Main Menu

FS-1 (FLIGHT SIMULATOR) (SL)

```
Ø................1Ø=96
1.5-21 BY 1.5..E=DB, F=AB,
                 1Ø=BF, A=3, 4E=1

7-8
9.5
```

GORGON (SRS)

```
Ø................1Ø=96, 9=Ø
1.5-E.5.........D=1, 24=96, A=3,
                 E=DD, F=AD, 1Ø=DA,
                 3B=4Ø
```

HYPERSPACE WARS * (CTS)

```
Ø-22.............9=Ø
```

JAW BREAKER * (SOL)

```
Ø-22.............9=Ø
3................3B=1, A=1, 4B=1,
                 4D=8, 5Ø=1
                 (ERROR 6 OK)
```

KRELL LOGO * (KL)

Ø-22

MAGIC WINDOW * (ART)

Ø-22

MASTER TYPE (old) * (LNS)

```
Ø-2..............8=1
3-22.............E=D4
```

MICRO WAVE * (CC)

```
Ø-22
11...............3B=1, A=1, 4B=1,
                 4D=8, 5Ø=1
```

MOUSKATTACK * (SOL)

```
Ø-22.............1Ø=96
   SECTMOD [S=3, T=18)
   DOS 3.3 PATCHED
   CHANGE ADDRESS B1
        FROM 49 TO 6Ø
```

MULTI PLAN (MIS)

```
Ø-22.............1Ø=96
```

PFS & PFS REPORT (SPC)

Use "Copy Disk" from Main Menu. After copying and before using, put a TAB over the write protect notch or you will turn into a lizard.

PHANTOMS FIVE (SRS)

```
Ø................9=Ø
2-1C.............3A=Ø, 5Ø=2Ø
```

PRISM * (ISM)

Ø-22

PRISONER * (EW)

Ø-22

RASTER BLASTER (Old & New Versions) (BC)

```
Ø................1Ø=96
5-11 BY 4.......D=1, 9=Ø, 31=Ø,
                A=2, E=AD, F=DE,
                3B=4Ø

6-12 BY 4
7.5-F.5 BY 4
1.5-3.5 BY 2
```

SABOTAGE * (SOL)

```
Ø-22
3................3B=1, A=1, 4B=1,
                 4D=8, 5Ø=1
                 (ERROR 6 OK)
```

SARGON * (HN)

Ø-1A

SERPENTINE (BS)

Same as Choplifter

SNACK ATTACK (DM)

```
Ø-12
   SECTMOD [T=Ø, S=3)
   DOS 3.2 PATCHED
   CHANGE ADDRESS 63
        FROM 38 TO 18
```

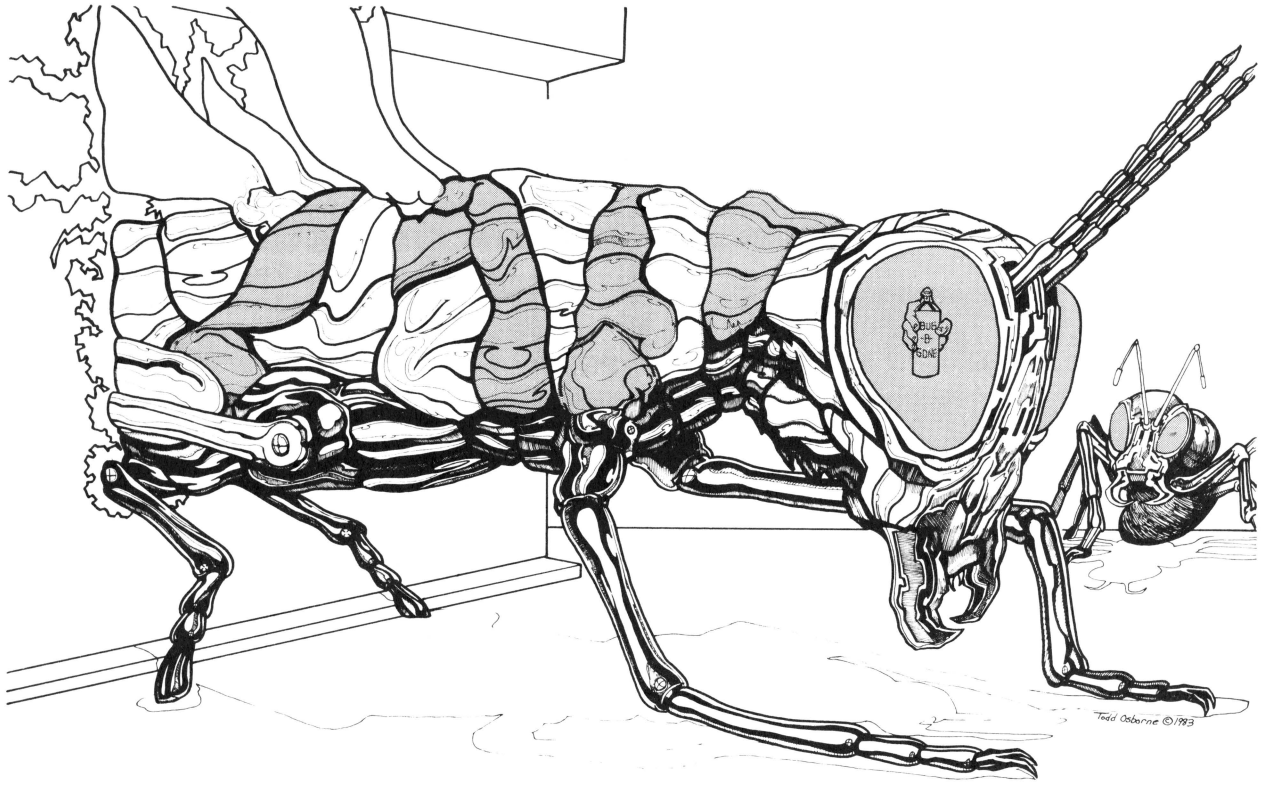
SNEAKERS (SRS)

```
Ø................9=Ø, 1Ø=96, 44=1,
                 45=1Ø, D=1
1.5-C.5.........44=Ø
D.5..............44=1
```

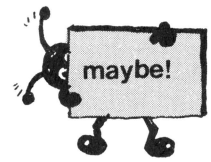
SOFTPORN ADVENTURE (old) (SOL)

```
Ø-22.............9=Ø
```

continued on page 32



NO MORE BUGS!



One of the most inexpensive methods of accumulating software (if your monetary status is not in the "rich" category) is to subscribe to magazines that print program listings and laboriously type them in and save them. And the most frustrating thing that can occur after typing in a lon-n-n-n-g listing is to find that it doesn't work.

And the reason it doesn't work is that it has bugs.

Some of the bugs are improperly printed listings. These are our bugs. They most often occur when we try to format a listing to make it easier to read and understand. Other bugs occur when the listing is sliced up and pasted onto boards in order to be photographed and printed.

We've eliminated our bugs. Listings will no longer be formatted. They will be printed just as they are seen on the screen (usually). And we will have all line numbers in consecutive increments of ten so that if a line is missing it will be spotted by the editorial staff.

Most bugs occur at the user's keyboard. The program is not typed in exactly as it was listed.

Syntax errors in BASIC listings are easily found because you are notified of this fact by the computer.

But many errors are not found because they are errors that are not really syntax-related. Most of these mistakes fall into this category. These include:

1. Transposition (typing 536 instead of 563).
2. Missing characters (forgetting to put in parentheses).
3. Mistaken characters (typing a colon instead of a semicolon).
4. Missing arguments (typing IF A THEN . . . , instead of IF A > 5 THEN . . .).
5. Missing GOSUBs and GOTOs, and their line numbers.
6. Mistyped data statements.

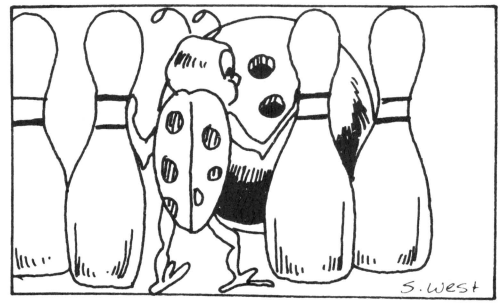
And a profusion of others . . .

These bugs are annoying, and require an inordinate amount of patience and determination to eliminate. Thus, we will now be using a solution that seems to have worked with other magazines: a program that will help spot bugs.

These programs are called "checksum" programs. *Nibble* uses one called *Key Perfect.* Our own are Checksoft (for Applesoft programs) and Checkbin (for machine programs).

NO MORE BUGS!

CHECKSOFT



REQUIREMENTS:
An Apple II or Apple II+
Applesoft
One disk drive

Checksoft is an ampersand utility for those who type in the programs listed in CORE and HARDCORE COMPUTIST. Checksoft will allow you to verify that the listing you have typed and the original one in the magazine are the same.

Any errors found can be easily traced to the individual lines and corrected. All that is necessary once Checksoft is in memory is to press the **&** (ampersand) key and compare the numbers displayed on the screen with those shown in the magazine.

Checksoft is designed to work only with Applesoft programs and will not work correctly on programs written in other languages such as Integer or binary.

Unique Options in Checksoft

Checksoft provides options that are not found in most other checksum programs.

1. Checksoft is written in machine language.
2. Checksoft provides a checksum for every line in a program and will detect the smallest differences in a program and the listing.
3. The beginning of the program affects the checksum. This double checks that the program starts at the correct location.
4. Checksums may be sent to a printer.
5. Checksoft can be configured to ignore:
   A. REM statements, allowing you to leave them out of a program and still have the same checksums as the original listing that contained REM s.
   B. Line numbers, so programs can be renumbered without affecting the checksums.

Since Checksoft will only work for Applesoft programs, the program in the listing must be accompanied by a checksum list generated by Checksoft.

by Robb Canfield

Checksoft will generate checksums that are different than those of other checksum programs (i.e., *Keyperfect* by Nibble), so a checksum list by other checksum programs will not match those by Checksoft.

Please read through the entire article before entering and using the program. You may be able to save yourself some extra work and frustration.

Typing In Checksoft

Checksoft works by generating a two-byte hexadecimal (base 16 number) checksum. A checksum is a number based on the collection of certain data; that is to say, a number that will be constantly changing in a predictable way. Checksoft will update its checksum for every line encountered in an Applesoft program. Since the checksum is cumulative, all the previous checksums generated (one for each line) affect the next one. This gives each program its own unique checksum. There is a small chance that two programs will have the same final checksum (since there are only 65,536 different possibilities), but this chance is so small that it's not worth losing sleep over.

I will refer to two different checksums from this point on:

1. The line checksum, which appears for every line of the program.
2. The final checksum, which appears as the last line checksum displayed.

Checksoft must first be typed into memory as a series of bytes (the source code is also included for those interested). After typing the machine language part of Checksoft, enter the Applesoft part of the program.

The directions below explain how to move Checksoft from the published listing to the computer's memory in simple step-by-step procedures.

1. Re-boot your Apple
   IN#6
To clear memory and make sure you are in Applesoft, also known as floating point,
   FP
(the Applesoft prompt is "]").

2. Enter the monitor with
   CALL -151
The machine language prompt should appear (as an asterisk "*"). If it doesn't, try CALL -151 again. If the prompt still refuses to appear, then something is definitely wrong with your Apple (you are using an Apple, aren't you?).

3. Type the following bytes

```
0300: A9 4C 8D F5 03 A9 10 8D
0308: F6 03 A9 03 8D F7 03 60
0310: 20 8E FD A9 10 8D 96 03
0318: A9 FB 8D 97 03 A9 14 85
0320: 0A A5 67 8D C8 03 85 0B
0328: A5 68 8D C9 03 85 0C A2
0330: 00 A0 00 20 C7 03 E0 02
0338: 90 22 E0 04 B0 03 48 90
0340: 0E C9 00 F0 1D C0 FF F0
0348: 13 C9 B2 D0 02 A0 FF 6A
0350: 45 0B 2A 45 0C 85 0B 45
0358: 0C 6A 85 0C 20 BF 03 E8
0360: D0 D4 68 A8 68 AA 98 20
0368: 24 ED 38 A9 06 E5 24 AA
0370: 20 4A F9 A0 02 B9 CB 03
0378: 20 ED FD 88 10 F7 A5 0B
0380: A6 0C 20 41 F9 20 8E FD
0388: C6 0A D0 1F A9 14 85 0A
0390: 20 8E FD AD 00 C0 10 FB
0398: 8D 10 C0 C9 83 F0 1C C9
03A0: 9B D0 08 A9 EA 8D 96 03
03A8: 8D 97 03 A2 00 A0 00 20
03B0: BF 03 D0 82 E0 01 F0 03
03B8: E8 10 F4 20 8E FD 60 EE
03C0: C8 03 D0 03 EE C9 03 AD
03C8: FF FF 60 A4 A0 AD
```

4. Double check what you have typed. You should still be in the monitor. Type
   300.378
Compare this to lines 300 to 378. The

only differences should be:

A. There is a zero before the first number in each of the lines.

B. A dash instead of a colon will appear after each line number (there will be a space after the dash). For example, line 300 will appear as:

0300- A9 4C 8D F5 03 A9 10 8D

The bytes themselves should be the same. After fixing any errors you may have found, examine the rest of the program by typing

380.3C8

and compare this to lines 380 to 3C8 in the listing. Fix all errors before continuing.

5. Return to BASIC
   3D0G

or if you have AutoStart simply press the RESET key. At this point you should see the Applesoft prompt, (]). If you see the integer prompt (>), type FP to enter Applesoft. You should now see the Applesoft prompt. Checksoft is not affected by language changes.

6. Save Checksoft to the disk
   BSAVE CHECKSOFT,A$300,L$D0

7. Erase the current program
   NEW

Then type the Applesoft program.

8. Save the Applesoft program
   SAVE START CHECKSOFT

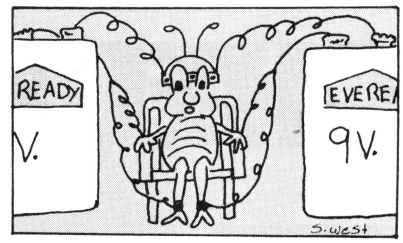
How To Use Checksoft

The easiest way to use Checksoft is to run the Applesoft program (the binary part of Checksoft must be on the disk under the name CHECKSOFT). Press RETURN when asked for the version to load (this will automatically load the normal version CHECKSOFT) and answer the next two questions with "Y" and "N", respectively.

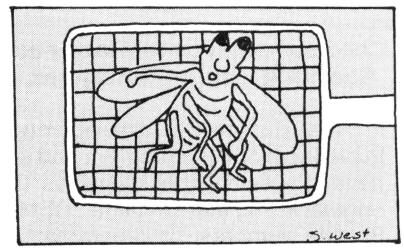
If you want to save yourself the extra effort of typing in the Applesoft program you may simply BRUN CHECKSOFT. When Checksoft is loaded in this manner, the Applesoft program in memory will remain intact (the variables will not even be disturbed). The loading of any Applesoft program will not disturb Checksoft (loading binary files — machine language programs — may erase Checksoft if they use the upper half of page $3).

The only reason I have included the BASIC program is so that the various options in Checksoft may be changed easily. These options may be changed manually, as I will explain later. Check-

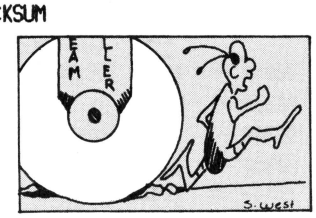
Checksoft




```
1000 ************************
1010 *                      *
1020 *       CHECKSOFT      *
1030 *                      *
1040 *         BY           *
1050 *                      *
1060 *    ROBB S. CANFIELD  *
1070 *                      *
1080 *     COPYRIGHT 1980   *
1090 *   SOFTKEY PUBLISHING *
1100 *                      *
1110 ************************
1120 *
1130 * LOCATIONS USED
1140 *
1150
1160 LINPRNT  .EQ $ED24    PRINT DECIMAL VALUE OF X AND A REG
1170 CROUT    .EQ $FD8E    PRINT A CARRIAGE RETURN
1180 COUT     .EQ $FDED    PRINT A REG IN ASCII
1190 PRINTAX  .EQ $F941    PRINT A AND X REG AS A TWO HEXBYTE NUMBER
1200 PRINT.X.SPACES .EQ $F94A
1210 BEG      .EQ $67      BEGINNING OF APPLESOFT PROGRAM
1220 HTAB     .EQ $24      HORIZONTAL POSITION OF CURSOR
1230 CLEAR    .EQ $C010    CLEAR KEYBOARD STROBE
1240 READ     .EQ $C000    LOAD A REG WITH KEY PRESSED
1250 COUNTER  .EQ $0A      COUNTER FOR NUMBER OF LINES
1260 CHKSUM   .EQ $B       CHECKSUM BYTES $B & $C
1270 AMPER    .EQ $3F5     AMPERSAND JUMP VECTOR
1280
1290
1300          .OR $300     PLACE ON PAGE 3
1310          .TF CHECKSOFT
1320
1330 *
1340 * INITIALIZATION FOR AMPERSAND
1350 *
1360
1370 INIT     LDA #$4C     SET UP AMPERSAND JUMP VECTOR
1380          STA AMPER
1390          LDA #SETUP
1400          STA AMPER+1
1410          LDA /SETUP
1420          STA AMPER+2
1430          RTS
1440
1450 *
1460 * PROGRAM STARTS HERE
1470 *
1480
1490 SETUP    JSR CROUT
1500          LDA #$10     OPCODE FOR BNE (SET KEY1 TO NORMAL)
1510          STA KEY1+3
```



```
1520          LDA #$FB      FOLLOWS BNE STATEMENT
1530          STA KEY1+4
1540          LDA #20       # OF LINES UNTIL STOPPED
1550          STA COUNTER
1560          LDA BEG       GET BEGINNING OF APPLESOFT PROGRAM
1570          STA GET+1
1580          STA CHKSUM    USE THIS BYTE FOR CHECKSUM
1590          LDA BEG+1
1600          STA GET+2
1610          STA CHKSUM+1
1620          LDX #00       SET COUNTER TO ZERO
1630          LDY #$00      CLEAR REM FLAG
1640 LOOP     JSR GET       GET A BYTE
1650 LOOP2    CPX #2        ON OFFSET?
1660          BCC SUMIT3    YES, SO SKIP END OF LINE CHECK
1670          CPX #4        ON LINE #?
1680          BCS SUMIT     NO, SO DON'T SAVE LINE #
1690          PHA           SAVE LINE #
1700          BCC SUMIT2    SKIP END OF LINE CHECK. DEFAULT IS TO USE LINE #
1710 SUMIT    CMP #0        END OF LINE?
1720          BEQ PRINTCHK YES SO PRINT CHECKSUM AND CHECK FOR END OF PROGRAM
1730          CPY #$FF      IGNORE REM?
1740          BEQ SUMIT3    YES
1750          CMP #$B2      TOKEN FOR REM
1760          BNE SUMIT2
1770          LDY #$FF      SET REM FLAG. DEFAULT IS TO IGNORE THEM
1780 SUMIT2   ROR
1790          EOR CHKSUM    ;GENERATE A CHECKSUM
1800          ROL
1810          EOR CHKSUM+1
1820          STA CHKSUM
1830          EOR CHKSUM+1
1840          ROR
1850          STA CHKSUM+1
1860 SUMIT3   JSR INCGET    INCREMENT COUNTERS
1870          INX
1880          BNE LOOP2     CONTINUE BY GETTING ANOTHER BYTE
1890 PRINTCHK PLA           GET HIGH BYTE OF LINE #
1900          TAY           SAVE IT TEMPORARILY
1910          PLA           GET LOW BYTE OF LINE #
1920          TAX           SET UP FOR LINE PRINT
1930          TYA           GET HIGH BYTE BACK
1940          JSR LINPRNT   PRINT DECIMAL LINE #
1950          SEC           CALCULATE THE NUMBER OF SPACES TO PRINT
1960          LDA #$6
1970          SBC HTAB
1980          TAX
1990          JSR PRINT.X.SPACES
2000          LDY #2        NUMBER OF CHARACTERS TO PRINT MINUS 1 (-1)
2010 PRINT1   LDA MSG1,Y
2020          JSR COUT      PRINT AREG IN ASCII
2030          DEY           DONE WITH PRINT?
2040          BPL PRINT1    NO. SO GET NEXT CHARACTER
2050          LDA CHKSUM    PRINT CHECKSUM VALUE
2060          LDX CHKSUM+1
```



soft will disable any ampersand utility you have in memory (such as PRINT USING and RENUMBER), but does not affect PLE (Program Line Editor).

After Checksoft is in memory, enter a program from a listing that has a checksum table created by Checksoft. (I have included the checksum table for the Applesoft program START CHECKSOFT, and will use examples from this program in the rest of the article.) After entering the program, type "&". If there is no Applesoft program in memory, Checksoft may display random line numbers and checksums (if this happens, use the ctrl C command to exit Checksoft).

The first twenty lines of your program will be displayed in the following fashion:

line# - $0000
(hexadecimal checksum)

For example:

10 - $E7C9

The checksum number will always be four digits long.

Compare the checksums given for each line of the program to those provided in the magazine. If the checksums match, the line is okay. If the two checksums differ, there is an error in the program.

The first line that has a checksum different than the one in the magazine is the offending line (remember that every checksum is based on the previous one, so if one line is incorrect all the following lines also appear to be incorrect). Fix this line and check the program again to see if any other lines were mistyped.

If the first twenty lines are okay, press the SPACE bar to display the next twenty lines. Proceed in this manner until you are returned to Applesoft.

Double check the program to make sure all the checksums match. When they all match, the program is exactly as given in the magazine.

This process can be reduced to the following:

1. Type the program into memory.
2. Press the ampersand key (&). The first twenty lines of the program will be displayed.
3. Compare the checksums on the screen to those in the listing. The first line encountered that doesn't match the checksum table printed in the magazine is in error and must be fixed before continuing.
4. Continue in this manner until all the checksums displayed on the screen match those in the table.

Commands

Checksoft has three commands available:

ctrl C **Exit Checksoft immediately. This command can be used to exit Checksoft without having to page through the remaining checksums.**

SPACE **Display the next twenty lines of the program with checksums.**

ESC **Does not pause after displaying twenty lines. This command can be used to rapidly check a program (see Trick 2 below).**

When the Applesoft prompt (]) appears, Checksoft has finished checking the program and has automatically returned you to Applesoft. There is no need to use ctrl C to exit.

Tricks

The following tricks may be used to help find where the checksums differ:

1. The first time through, press ESC and look at the last checksum printed (the final checksum). If this one matches the final one in the magazine, you have successfully typed in the program. If this checksum doesn't match, the program is different from the one in the magazine. Try Trick 2.

2. When paging through the checksum tables, only compare the last checksum printed for each set of twenty. When you find that they differ, backtrack until you find the offending line (the first line with a different checksum than listed).

Modifying Checksoft

The following is a discussion of how to modify Checksoft for different types of listings. Checksoft can be configured in a number of different ways. You have the option to use or ignore the following:

1. REMark statements.
2. Line numbers.
3. Next line pointers.

For convenience I am going to refer to each of the three possible changes as three separate parameters. Checksoft is normally set up to ignore REMark statements, use line numbers, and ignore line pointers.

If any of the above parameters are changed, Checksoft will generate different checksums. Each parameter has its own special function. The REMark parameter can be configured so that everything after a REM statement is ignored. This allows you to simply type the command REM and leave out all the garbage following it without affecting the checksum. Or you could even replace the original REM statement with your own, again without affecting the checksum.

Only existing REMs may be changed; no new REMarks may be created. This is the most useful and powerful parameter.

For example, assume that the following line appears in a program:

10 D$ = CHR$ (4): REM CTRL "D"

If you wanted to, you could change the line to the following:

10 D$ = CHR$ (4): REM

or:

10 D$ = CHR$ (4): REM ANYTHING CAN GO HERE

without affecting the checksums.

```
2070            JSR PRINTAX
2080            JSR CROUT
2090            DEC COUNTER   DONE WITH 20 LINES
2100            BNE NOSTOP    NO, SO CONTINUE
2110            LDA #20       YES, SO GET KEYPRESS
2120            STA COUNTER   AND RESET COUNTER
2130            JSR CROUT
2140 KEY1       LDA READ      GET A KEYPRESS
2150            BPL KEY1      LOOP UNTIL A KEY IS PRESSED
2160            STA CLEAR     CLEAR KEYBOARD STROBE
2170            CMP #$83      WAS IT CTRL C?
2180            BEQ END       YES, SO STOP PROGRAM
2190            CMP #$9B      WAS IT ESC?
2200            BNE NOSTOP    NO, SO CONTINUE NORMALLY
2210
2220 *
2230 * CHANGES PROGRAM TO IGNORE KEYPRESSES
2240 *
2250
2260 STOP       LDA #$EA      SET BRANCH IN KEY1 TO NOPS
2270            STA KEY1+3
2280            STA KEY1+4
2290
2300 *
2310 * CONTINUE WITH PROGRAM
2320 *
2330
2340 NOSTOP     LDX #$00      CHECK FOR END
2350            LDY #$00      CLEAR FLAG
2360 NOSTOP2    JSR INCGET    GET NEXT BYTE
2370            BNE LOOP2     IF NO ZERO WAS ENCOUNTERED CONT.
2380            CPX #$1       IS THIS THE 3RD ZERO?
2390            BEQ END       IF SO END
2400            INX           CHECK FOR LAST ZERO (3RD)
2410            BPL NOSTOP2   ALWAYS DO THIS
2420 END        JSR CROUT     DONE WITH PROGRAM
2430            RTS           RETURN TO APPLESOFT
2440
2450 *
2460 * SUBROUTINES CALLED FROM MAIN PROGRAM
2470 *
2480
2490 INCGET     INC GET+1     ADD ONE TO THE VALUE IN GET
2500            BNE GET       IS THERE A CARRY OVER
2510            INC GET+2     YES INCREMENT HIGH BYTE
2520 GET        LDA $FFFF     GETS A VALUE FROM APPLESOFT
2530            RTS
2540
2550 *
2560 * PRINT MESSAGES
2570 * THE MESSAGE IS STORED BACKWORDS
2580 *
2590
2600 MSG1       .AS -"$ -"
2610 *
2620 * LOCATION FOR TEMPORARY USES
2630 *
```

The following would be illegal:

10 D$ = CHR$ (4):

since the REM statement is missing. If anything else was changed, such as D$ to E$, the checksum would also be changed and therefore would be illegal.

If the REMark parameter is set up to use REM s, the REMark must be typed exactly as shown in the listing.

The line number parameter can also be configured to ignore or use the line numbers. This parameter was originally set up to use line numbers. This means that each line number must be typed exactly as shown.

If this parameter is changed to ignore line numbers, line numbers may be changed when typed. This only applies to the line number, not to line references such as GOTO s or GOSUB s. These line references must still be typed exactly as printed in the magazine.

For example, again assume that the following line exists in a program:

10 D$ = CHR$ (4): GOTO 900

The following change is legal if the line numbers are ignored:

15 D$ = CHR$ (4): GOTO 900

The line number has been changed from 10 to 15. This change would not have been allowed if it had been specified to use line numbers.

The following change is illegal and would affect the checksum in all situations:

10 D$ = CHR$ (4): GOTO 980

The line reference has been changed from 990 to 980.

The line pointer is a special parameter that will be used very rarely. When it is used, the program must have the same number of bytes in each line. That is, each line must take up the same amount of memory as it did originally. Generally, if the line pointer is used the author wants the program typed in exactly as shown with absolutely no changes.

Below are some common configurations that may be used and when to use them. To conserve space, I have abbreviated each of the three parameters to:

REM	**REMark statements**
Line	**Line numbers**
Point	**Next line pointers**

Configuration 1

This is what Checksoft is normally set to. REMark statements can be changed or deleted, but everything else must remain the same.

REM - Ignore (off)
Line - Use (on)
Point - Ignore (off)

Configuration 2

This is especially useful in self-modifying or length-dependent code. The program must be typed in exactly as shown. No changes can be made, no matter how slight they are.

REM - Use (on)
Line - Use (on)
Point - Use (on)

Configuration 3

This can be used if there are no line references within the program. The only real advantage it has is to allow the line numbers to be changed (such as renumbering the program) without affecting the checksums.

REM - Ignore (off)
Line - Ignore (off)
Point - Ignore (off)

There are two ways to modify Checksoft: one is to use the BASIC program, and the other is to POKE the changes into memory. The BASIC program will tell if Checksoft is configured normally or not by changing the top line of text. For normal configuration, the top line will read "NORMAL CONFIGURATION IS". If Checksoft has been modified, this line will change to "NON-NORMAL CONFIGURATION IS".

To change Checksoft, simply answer "N" when asked if this is the proper configuration. You will then be asked if you want to use or ignore the three possible parameters. Answer with "Y" for Yes, "N" for No, or press RETURN if you wish it to remain the same.

The modified Checksoft may then be saved to the disk under any name. Pressing RETURN will cause the

Checksums for Start Checksoft

Configuration 1

```
1    - $97CE   130  - $7AD8   260  - $7EF8   390  - $1DD0   530  - $254A
2    - $F48B   140  - $9536   270  - $68B1   400  - $A7EE   540  - $55ED
3    - $B8EC   150  - $4F85   280  - $D09E   410  - $6FAC   550  - $7402
10   - $E7C9   160  - $817F   290  - $ECF8   420  - $ABA5   560  - $E8E8
20   - $DCE6   170  - $C8EA   300  - $8AEC   430  - $A7AA   570  - $A88B
30   - $781C                  310  - $4B42   440  - $460D
40   - $A12C   180  - $1D6C   320  - $1A2E   450  - $1E5B   580  - $79E8
50   - $C14E   190  - $5BD9   330  - $816E   460  - $6861   590  - $0827
60   - $30A3   200  - $B092   340  - $1B1A   470  - $8C18   600  - $00B7
70   - $D960   210  - $9EAB   350  - $877F   480  - $100A   610  - $2668
80   - $D228   220  - $F52A   360  - $7B8C   490  - $F841   620  - $D0CC
90   - $CC76   230  - $0817   370  - $36FA   500  - $C946   630  - $6E2C
100  - $E735   240  - $736E                  510  - $346D   640  - $0307
110  - $FFB5   250  - $1C37   380  - $CE92   520  - $B687   650  - $144C
120  - $41CB
```

BEG: *300.3CD END:

Hex Dump and Checksums for Checksoft

```
0300- A9 4C 8D F5 03 A9 10 8D  $2C5A
0308- F6 03 A9 03 8D F7 03 60  $BB3A
0310- 20 8E FD A9 10 8D 96 03  $A383
0318- A9 FB 8D 97 03 A9 14 85  $EEB6
0320- 0A A5 67 8D C8 03 85 0B  $8884
0328- A5 68 8D C9 03 85 0C A2  $171C
0330- 00 A0 00 20 C7 03 E0 02  $EFA7
0338- 90 22 E0 04 B0 03 48 90  $B2DB
0340- 0E C9 00 F0 1D C0 FF F0  $2B27
0348- 13 C9 B2 D0 02 A0 FF 6A  $F4C8

0350- 45 0B 2A 45 0C 85 0B 45  $4E77
0358- 0C 6A 85 0C 20 BF 03 E8  $869B
0360- D0 D4 68 A8 68 AA 98 20  $0224

0368- 24 ED 38 A9 06 E5 24 AA  $FAF5
0370- 20 4A F9 A0 02 B9 CB 03  $F441
0378- 20 ED FD 88 10 F7 A5 0B  $27ED
0380- A6 0C 20 41 F9 20 8E FD  $9356
0388- C6 0A D0 1F A9 14 85 0A  $2DBF
0390- 20 8E FD AD 00 C0 10 FB  $3B3A
0398- 8D 10 C0 C9 83 F0 1C C9  $32D2

03A0- 9B D0 08 A9 EA 8D 96 03  $16EC
03A8- 8D 97 03 A2 00 A0 00 20  $5056
03B0- BF 03 D0 82 E0 01 F0 03  $0AE2
03B8- E8 10 F4 20 8E FD 60 EE  $A485
03C0- C8 03 D0 03 EE C9 03 AD  $1A30
03C8- FF FF 60 A4 A0 AD        $6118
```

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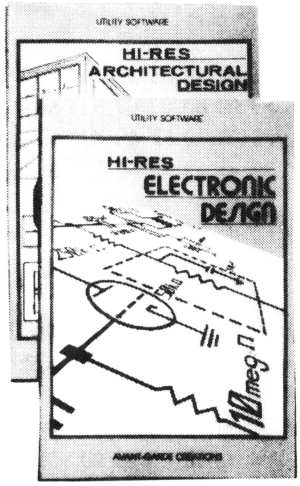

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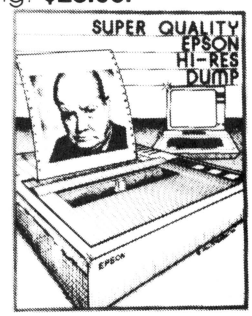

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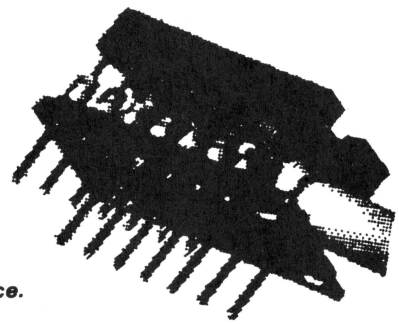

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default name to be used. The default name is CHECKSOFT unless you decided to enter another name when you were asked for the version to load, causing the new name to become the default.

There is one POKE for each of the possible parameters.

REMarks:

1. Ignore	**POKE 846,255 (Standard)**
2. Use	**POKE 846,00**

Line numbers:

1. Ignore	**POKE 832,27**
2. Use	**POKE 832,14 (Standard)**

Next line pointers:

1. Ignore	**POKE 825,34 (Standard)**
2. Use	**POKE 825,21**

The configuration type must accompany the checksum table, and Checksoft must be configured in that same manner before checking the program, otherwise the checksums won't match. For example, if I used Configuration 2, then your version of Checksoft must be changed to Configuration 2 or the checksums would not match.

Using Checksoft with a Printer

If you want a printout of the checksums, simply turn on the printer before calling Checksoft (&). To turn on your printer type PR#n, where n is the slot that the printer interface card is in. Since the interface card is usually located in slot one, PR#1 will turn on most printers. PR#0 will turn off the printer. Make sure that the printout goes to the screen as well as the printer. Your printer manual should have information on how to do this.

How Does Applesoft Store A Program?

Before discussing how Checksoft works, a review of how Applesoft stores a program is in order. An Applesoft line consists of four parts:

1. The next-line pointer, a two-byte number that points to the place in memory where the next line is located.
2. The line number, also two bytes. Line numbers are converted to hexadecimal before being stored.
3. The tokenized line itself.
4. And 00 to mark the end of the line.

When you type a line in Applesoft, it is tokenized. This is a process whereby a large amount of information may be encoded to fit into a small amount of memory. See page 121 of the *Applesoft Manual* for a list of tokens.

In Applesoft there is a one-byte code for each of the commands (PRINT, REM, POKE, etc.). The one-byte code takes the place of the letters for the command. This means that only one byte, instead of five, is being used each time the PRINT command is required. That shrinks the amount of space required to store a line tremendously.

There is also a code for each of the letters, numbers, and symbols. This doesn't save space, but it insures that no two commands and/or characters have the same code.

A zero (00) is added to the line being tokenized to mark its ending. Two extra zeros would be added if this was the last line of the program.

After the line is tokenized, Applesoft searches for a line number. If one was not given, it immediately processes the line (immediate mode). Otherwise the line number is converted into its hexadecimal equivalent (deferred mode). After this conversion is done, a check is made to see where in memory the line will go. The next line pointer is then set to point to the end of the line plus one (right after the 00). The line is then stored in memory in the order mentioned above.

The following is an example of how an Applesoft line is stored:

20 D$ = CHR$ (4): REM CTRL "D"

First the line is tokenized. D$= is tokenized character-by-character into the values $44 $24 $D0. Since CHR$ is considered a command, it is reduced to one byte, $E7. The (4): is stored as four separate characters, $28 $34 $29 $3A. The REM is another command, so it is stored as $B2.

Illustration 1

SAMPLE LINE WITH CORRESPONDING HEX TOKENS

20	D $	=	CHR$	(	4	)	:	REM
14 00	44 24	D0	E7	28	34	29	3A	B2	20

Start Checksoft

```
1   REM  * START CHECKSOFT
2   REM  * WRITTEN BY
3   REM  * ROBB CANFIELD
10  D$ =  CHR$ (4): REM   CTRL "D"
20   TEXT : HOME
30   INVERSE
40   PRINT : HTAB 15: PRINT "CHECK
     SOFT"
50   NORMAL
60   VTAB 11: PRINT "ENTER VERSION
       OF CHECKSOFT TO USE."
70   PRINT "DEFAULT VERSION IS 'CH
     ECKSOFT'"
80   PRINT
90   HTAB 7: INPUT " > ";NA$
100   IF  LEN (NA$) < 1 THEN NA$ =
     "CHECKSOFT"
110   INVERSE
120   VTAB  PEEK (37): HTAB 10: PRINT
     NA$
130   NORMAL
140   PRINT D$"BLOAD"NA$
150 LN$ = "YES":OF$ = "NO ":RM$ =
     "NO "
160   IF  PEEK (825) = 21 THEN OF$
       = "YES"
170   IF  PEEK (832) = 27 THEN LN$
       = "NO "
180   IF  PEEK (846) = 0 THEN RM$ =
     "YES
190   HOME
200   PRINT : PRINT  SPC( 10)"NORM
     AL CONFIGURATION IS"
210   VTAB 6
220   PRINT  SPC( 10)"USE REMARKS"
230   PRINT
```

The REM is an exception to the rule that each command has a one-byte code. After the REM is stored ($B2), a space is added to the line ($20). The DATA command works the same way. The rest of the line is stored as characters — $43 $54 $52 $4C $20 $22 $44 $22 —since Applesoft ignores any commands in a REMark statement. A zero is added to mark the end of the line.

This leaves the line consisting of the following bytes:

$44 $24 $D0 $E7 $28 $34 $29 $3A $B2 $20 $43 $54 $52 $4C $20 $22 $44 $22 $00

The line was reduced from 23 bytes to 20. This adds up to a lot of space saved in a long program, especially if REM s are left out.

Next, the line number is converted to hexadecimal. The decimal number 20 becomes $14 in hexadecimal, but since all line numbers are two bytes, a zero is used in the second byte (it is standard in machine language to store all numbers in the low/high format; low byte first, high byte second).

Now the only thing left is the next line pointer. To show this, I will assume that there was a previous line as follows:

10 HOME

Illustration 2

```
801:07 08 0A 00 97 00 1E
808:08 14 00 44 24 D0 E7 28
810:34 29 3A B2 20 43 54 52
818:4C 20 22 44 22 00 00 00
```

It would be tokenized into the following bytes: $0A $00 $97 00 (the line number and the HOME command). The program will be placed at $801 in memory (this is where Applesoft normally starts a program).

Illustration 2 is a hex dump (a listing of hexadecimal bytes) obtained by typing the BASIC program given above and then entering the monitor to list the desired bytes. To duplicate my efforts, do the following:

1. Type FP to clear any Applesoft programs in memory and to set the beginning of the program to $801.
2. Type the basic program used above:

10 HOME
20 D$ = CHR$(4):REM CTRL "D"

3. Enter the monitor with

CALL -151

4. List the bytes

801.81F

5. Re-enter basic with 3D0G or press the RESET key if you have AutoStart ROM.

In Illustration 2, the first two bytes tell where the next line begins (remember that these bytes are in reverse order: 07 08). In this case, the next line starts at $807. The line number is at $803 and $804 with the tokenized line following. The zero marks the end of the line.

The next byte is the beginning of line 20. Line 20 starts at $807 and begins with the next line pointer pointing to $814. What follows is the line number, tokenized line, and the zero. Two more zeros are found after this line. This lets Applesoft know where the program ends.

Applesoft also uses four locations in memory to indicate where the program starts and where it ends. Locations $67 and $68 (decimal 103 and 104) point to the beginning of the program (again the bytes are in a reverse order). Locations $AF and $B0 (decimal 175 and 176) point to the end of the program (these are also in the reverse order).

How Does Checksoft Work?

The first thing Checksoft does is find the start of the program by checking locations $67 and $68. After it finds the beginning, Checksoft puts every byte of the entire program (until it encounters three zeros in a row) through the checksum routine.

Checksoft keeps track of its location on every line by using a counter (this counter is reset to zero whenever a new line is encountered). If this counter is at two or three, the current bytes are temporarily saved (these two bytes are the line number). When the end of that line is found, the two bytes saved are retrieved and converted to decimal, then printed.

After the line is printed, Checksoft does an HTAB to six and prints the message "CHECKSUM $" along with the current checksum value. Another counter keeps track of how many lines have been displayed, stopping every 20. The program also checks for the various commands at this time. If the ESC key has been pressed, Checksoft modifies itself so that it will no longer pause and wait for a command before displaying the next 20 lines.

```
240  PRINT  SPC( 10)"USE LINE NUM
     BERS"
250  PRINT
260  PRINT  SPC( 10)"USE OFFSETS"
270  PRINT
280  INVERSE : VTAB 6: HTAB 30: PRINT
     RM$
290  VTAB 8: HTAB 30: PRINT LN$
300  VTAB 10: HTAB 30: PRINT OF$
310  NORMAL
320  IF RM$ <  > "NO " OR LN$ <  >
     "YES" OR OF$ <  > "NO " THEN
      VTAB 2: HTAB 7: PRINT "NON-
     ": GOTO 340
330  VTAB 2: HTAB 7: PRINT  SPC(
     4): PRINT
340  VTAB 20: PRINT "IS THIS CONF
     IGURATION CORRECT? ";: GET A
     $: IF A$ = "Y" THEN 530
350  VTAB 6: HTAB 30: PRINT "Y/N"
     ;: GET A$
360  IF A$ =  CHR$ (13) THEN 380
370 RM$ = "NO ": IF A$ = "Y" THEN
     RM$ = "YES"
380  INVERSE
390  HTAB 30: PRINT RM$
400  NORMAL
410  VTAB 8: HTAB 30: PRINT "Y/N"
     ;: GET A$
420  IF A$ =  CHR$ (13) THEN 440
430 LN$ = "NO ": IF A$ = "Y" THEN
     LN$ = "YES"
440  INVERSE
450  HTAB 30: PRINT LN$
460  NORMAL
470  VTAB 10: HTAB 30: PRINT "Y/N
     ";: GET A$
480  IF A$ =  CHR$ (13) THEN 500
```

How To Generate The Checksums

The Checksum Algorithm is the routine in Checksoft which generates the checksums. Every time a byte is sent to this routine, the checksum will change.

Unless you know machine language, you will not understand the technique I use to generate my checksums. I will continue to use this technique in any later editions I write (unless a bug is found, in which case the routine will be corrected and a note to that effect will be given). In this way I will always generate the same checksums, regardless of how the rest of the program is written.

The method I use will catch missing letters and transposed letters (such as TETX instead of TEXT) along with any other errors that are made. For those interested in machine language, I rotate the bytes numerous times to catch transposition errors, and exclusively OR it with the last checksums in a manner that will catch even the slightest error (even an error in one bit of a 27-sector program).

The BASIC Program

I included the BASIC program to allow easy changes to Checksoft. The only thing it does is to make all the POKEs for you. It is a straightforward program that requires no explanations.

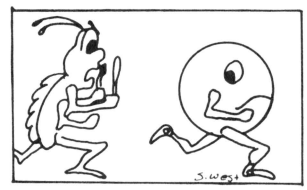
Nonetheless, I would like to point out a very useful technique. In lines 120 and 610, I do a VTAB PEEK (37). This VTABs to the text line directly above the current line. For example, if something was printed on line three, normally line four would be printed on next. But this doesn't occur because location 37 ($25 HEX) contains a value of three (in fact this location contains the current line minus one, so do NOT VTAB PEEK (37) from line one or an error will occur).

This technique worked very well when I wanted to print right over where the input was, without having to keep track of where I actually was on the text screen. This can add a nice touch to your own BASIC programs.

Get Some Sleep

Gone forever are those long, sleepless nights spent poring over listings, trying to find that one "little" error. Checksoft will track down that error, no matter what line it's in.

Pleasant dreams.



```
490 OF$ = "NO ": IF A$ = "Y" THEN
    OF$ = "YES"
500  INVERSE
510  HTAB 30: PRINT OF$
520  GOTO 310
530 OF = 34: IF  LEFT$ (OF$,1) =
    "Y" THEN OF = 21
540 LN = 14: IF  LEFT$ (LN$,1) =
    "N" THEN LN = 27
550 RM = 255: IF  LEFT$ (RM$,1) =
    "Y" THEN RM = 00
560  POKE 825,OF: POKE 832,LN: POKE
    846,RM
570  PRINT : VTAB 20: PRINT "DO Y
    OU WISH TO SAVE THIS VERSION
     TO THE DISK? ";: GET A$
580  IF A$ = "Y" THEN  HOME : PRINT
    : VTAB 12: INPUT "SAVE THIS
    VERSION AS ";A$
590  IF  LEN (A$) > 0 THEN NA$ =
    A$
600  INVERSE
610  VTAB  PEEK (37): HTAB 22: PRINT
    NA$
620  NORMAL
630  PRINT D$;"BSAVE"NA$",A$300,L
    $D0"
640  CALL 768: HOME : PRINT NA$"
    IS READY"
650  NEW : REM   ERASE PROGRAM IN
     MEMORY
```

ADVANCED PLAYING TECHNIQUES

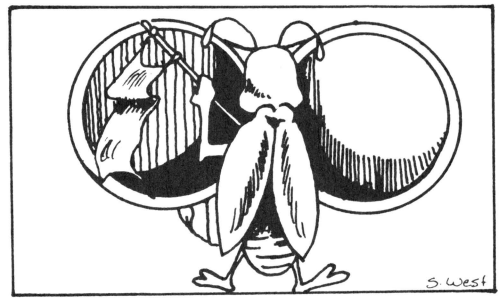
Choplifter, Broderbund Software, 1938 Fourth Street, San Rafael, California 94901, (415) 456-6424.

Choplifter

Many people don't know that ctrl L will regulate the level of play in Choplifter. Ctrl L followed by these numbers will get the specified results:

0 One tank attacking you
1 Two tanks and jets
2 Two tanks and jets, and two drones
3 Two tanks and jets, and two drones that fire

You will also find that making the prisoners walk back to Base, instead of flying them back, will cause those prisoners who go into the Post Office to completely disappear from the game (the scorekeeper will not update the information).



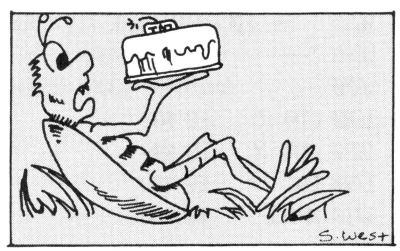
NO MORE BUGS!

CHECKBIN

Checkbin

by Robb Canfield

```
1000 ************************
1010 *                      *
1020 *       CHECK-BIN      *
1030 *                      *
1040 *          BY          *
1050 *                      *
1060 *    ROBB S. CANFIELD  *
1070 *                      *
1080 *    COPYRIGHT 1980    *
1090 *   SOFTKEY PUBLISHING *
1100 *                      *
1110 ************************
1120 *
1130 * LOCATIONS USED
1140 *
1150
1160
1170 *------------------------------
1180 * LOCATIONS IN THE MONITOR
1190 *------------------------------
1200
1210 COUT      .EQ $FDED    PRINT ACCUMULATOR IN ASCII
1220 CROUT     .EQ $FD8E    PRINT A CARRIAGE RETURN
1230 GETNUM    .EQ $FFA7    CONVERT THE NUMBER AT $200 INTO HEX
1240 INPUT.BUFFER .EQ $200 THE INPUT BUFFER
1250 NXTA1     .EQ $FCBA    INCREMENT A1L,A1H
1260 PRA1      .EQ $FD92    PRINT A1L,A1H IN HEX AND A DASH "-
1270 PRBYTE    .EQ $FDDA    PRINT THE ACCUMULATOR IN HEX
1280 PRINT.SPACES .EQ $F948 PRINT THREE SPACES
1290 PRINTAX   .EQ $F941    PRINT THE ACCUMULATOR AND X-REG IN HEX
1300 PRINT.X.SPACES .EQ $F94A PRINT X SPACES
1310 RETURN    .EQ $FF58    A GUARANTEED RETURN COMMAND (RTS)
1320 STACK     .EQ $100     THE APPLE STACK
1330
1340
1350 *------------------------------
1360 * LOCATIONS IN I/O AREA (PAGE $C0)
1370 *------------------------------
1380
1390 CLEAR     .EQ $C010    CLEAR KEYBOARD STROBE
1400
1410 READ      .EQ $C000    READ KEYBOARD STROBE
1420
1430
1440 *------------------------------
```



REQUIREMENTS:
An APPLE II or APPLE II+
One disk drive

Checkbin is a checksum utility which will be used to confirm the accuracy of binary programs typed from future issues of both CORE and HARDCORE COMPUTIST.

Checkbin has many points in common with Checksoft, even though Checksoft is for use with Applesoft programs. They both generate the same type of checksums, they have nearly identical commands, and they must be used on programs that are in memory.

Checkbin has the following features:

1. The program is written in machine language.
2. A checksum is provided for every eight bytes of machine code.
3. Checkbin is relocatable (more on this later).
4. Checksums may be sent to a printer.

Every program that is to be verified by Checkbin must be accompanied by a checksum list generated by Checkbin. This is the same general technique that was used with Checksoft. Checkbin essentially works the same way as Checksoft, and has the same limitations.

Checkbin must be typed into memory as a series of bytes (the source code is included for the curious). There is no Applesoft program for Checkbin like there is for Checksoft. It was written to stand alone.

1. To make sure DOS is intact and working, reboot your Apple
IN#6
2. Enter the monitor
CALL-151
3. Type the following bytes

```
0300: 20 58 FF BA CA BD 00 01
0308: 18 69 1F 8D F9 03 85 62
0310: E8 BD 00 01 69 00 8D FA
0318: 03 85 63 A9 4C 8D F8 03
0320: 60 20 8E FD A9 0A 85 0A
0328: A0 00 84 31 20 A7 FF A9
```

```
0330: FF 85 31 A5 3C 85 0B A5
0338: 3D 85 0C 20 A7 FF A0 55
0340: A9 10 91 62 A9 FB C8 91
0348: 62 A0 00 F0 45 A5 3C 29
0350: 07 D0 42 38 A9 1F E5 24
0358: AA 20 4A F9 A9 A4 20 ED
0360: FD A5 0B A6 0C 20 41 F9
0368: C6 0A D0 26 20 8E FD A9
0370: 0A 85 0A AD 00 C0 EA EA
0378: 8D 10 C0 C9 83 F0 48 C9
0380: A0 F0 BB C9 9B D0 0B A9
0388: EA A0 55 91 62 C8 91 62
0390: A0 00 20 92 FD A9 A0 20
0398: ED FD B1 3C 48 20 DA FD
03A0: 68 6A 45 0B 2A 45 0C 85
03A8: 0B 45 0C 6A 85 0C 20 BA
03B0: FC 90 9A A9 1F E5 24 AA
03B8: 20 4A F9 A9 A4 20 ED FD
03C0: A5 0B A6 0C 20 41 F9 20
03C8: 8E FD 8D 10 C0 60
```

4. Double check what you have typed. You should still be in the monitor. Type
   300.378
Compare this to lines 300 through 378 in the listing.
5. Return to BASIC with
   3D0G
or by pressing the RESET key if you have AutoStart ROM.
6. Save Checkbin
   BSAVE CHECKBIN,A$300,L$D0

How To Use Checkbin

As previously mentioned, Checkbin and Checksoft have nearly identical commands. The only major difference is in how they are accessed. To use Checkbin, you must be in machine language, but you should already be there after typing a machine language program into memory. The command to start Checkbin is ctrl Y. This works much the same way as the ampersand key in Applesoft.

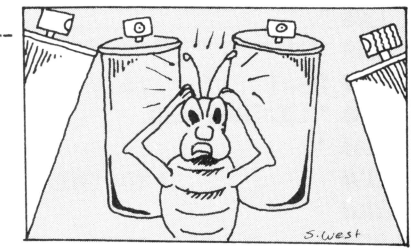
Type the beginning address of the machine language program you wish to check (remember, it must be in memory), then a period and the ending address of the program (both these addresses will be given with the listing), and a ctrl Y. The screen will fill with ten lines of code, each line consisting of an address, one to eight hexadecimal bytes, and a checksum value.

Example:

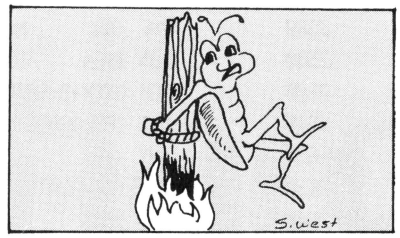
0300- 45 56 56 56 56 56 56 56 $F987

The number to the left of the dash is

```
1450 * MONITOR PAGE 0 LOCATIONS
1460 *--------------------------------
1470
1480 HTAB     .EQ $24      CURSOR LOCATION HORIZONTALLY
1490 MODE     .EQ $31      MODE COUNTER FOR GETNUM
1500 A1L      .EQ $3C      START OF MEMORY TO LIST, LOW BYTE
1510 A1H      .EQ $3D      START OF MEMORY TO LIST, HIGH BYTE
1520 A2L      .EQ $3E      END OF MEMORY TO LIST, LOW BYTE
1530 A2H      .EQ $3F      END OF MEMORY TO LIST, HIGH BYTE
1540
1550
1560 *--------------------------------
1570 * LOCATIONS I USE ON PAGE 0
1580 *--------------------------------
1590
1600 CHKSUM   .EQ $0B      THE CHECKSUM VALUES ($0B AND $0C)
1610 COUNTER  .EQ $0A      COUNTER FOR NUMBER OF LINES PRINTED
1620 RELOCATE .EQ $62      THE LOCATION WHERE CHECKBIN IS
1630
1640 *--------------------------------
1650 * THE FOLLOWING ARE KEY CODES
1660 *--------------------------------
1670
1680 CTRL.C   .EQ $83
1690 CTRL.Y   .EQ $99
1700 ESC      .EQ $9B
1710 SPACE    .EQ $A0
1720
1730 *--------------------------------
1740 * PAGE 3 LOCATIONS
1750 *--------------------------------
1760
1770 CTRL.Y.VECTOR .EQ $3F8 LOCATION TO JUMP TO WHEN A CTRL.Y IS PRESSED
1780
1790
1800
1810
1820
1830          .OR $300     PLACE ON PAGE 3
1840          .TF CHECKBIN
1850
1860 *--------------------------------
1870 * INITIALIZATION FOR CTRL.Y.VECTOR
1880 *--------------------------------
1890
1900 INIT     JSR RETURN   FIND WHERE WE ARE AT
1910          TSX
1920          DEX
1930          LDA STACK,X
1940          CLC
1950          ADC #SETUP-INIT-$2
1960          STA CTRL.Y.VECTOR+1 POINT CTRL.Y JUMP VECTOR HERE
1970          STA RELOCATE
1980          INX
1990          LDA STACK,X
2000          ADC #$00
```



```
2010          STA CTRL.Y.VECTOR+2
2020          STA RELOCATE+1
2030          LDA #$4C
2040          STA CTRL.Y.VECTOR
2050          RTS
2060
2070 *--------------------------------
2080 * PROGRAM STARTS HERE
2090 *--------------------------------
2100
2110 SETUP    JSR CROUT
2120          LDA #10       LIST 10 LINES AT A TIME
2130          STA COUNTER
2140          LDY #$00      GET CHARACTERS FROM INPUT BUFFER
2150          STY MODE      CLEAR MODE
2160          JSR GETNUM    TRANSLATE ASCII TO HEX AND PUT IN A1L,A1H
2170          LDA #$FF      SET MODE
2180          STA MODE
2190          LDA A1L       USE FIRST ADDRESS AS STARTING CHECKSUM
2200          STA CHKSUM
2210          LDA A1H
2220          STA CHKSUM+1
2230 CONT     JSR GETNUM    CONVERT 2ND NUMBER TO HEX
2240 START2   LDY #KEY+3-SETUP RE-ENABLE PAUSE COMMMAND
2250          LDA #$10
2260          STA (RELOCATE),Y
2270          LDA #$FB
2280          INY
2290          STA (RELOCATE),Y
2300          LDY #$0       CLEAR Y-REG AND SET ZERO FLAG
2310          BEQ XAM       ALWAYS DO THIS BRANCH
2320 MOD8CHK  LDA A1L       HAVE EIGHT BYTES BEEN PRINTED?
2330          AND #$07
2340          BNE CHECKSUMS NO. SO CONTINUE TO PRINT BYTES
2350          SEC
2360          LDA #31       CALC NUMBER OF SPACES TO PRINT
2370          SBC HTAB
2380          TAX
2390          JSR PRINT.X.SPACES
2400          LDA #'$+$80   PRINT A DOLLAR SIGN ($)
2410          JSR COUT
2420          LDA CHKSUM    PRINT THE CHECKSUM VALUE
2430          LDX CHKSUM+1
2440          JSR PRINTAX
2450          DEC COUNTER   COUNTER FOR NUMBER OF LINES
2460          BNE XAM       IF NOT ZERO THEN CONTINUE
2470          JSR CROUT     OTHERWISE PAUSE
2480          LDA #10       RESET COUNTER
2490          STA COUNTER
2500 KEY      LDA READ      GET KEYPRESS
2510          BPL KEY       WAIT FOR A KEY TO BE PRESSED
2520          STA CLEAR     CLEAR BUFFER
2530          CMP #CTRL.C   STOP PROGRAM?
2540          BEQ DONE      YES!
2550          CMP #SPACE    RESET PAUSE FUNCTION?
2560          BEQ START2    YES!
2570          CMP #ESC      DISABLE PAUSE FUNCTION?
```



the location of the bytes in memory after the line is stored. The eight bytes should appear in both the listing and the checksum value. The number of bytes on the first and last line of the listing may change slightly, but will never be more than eight or less than one.

If the checksum matches the one in the listing, all is okay and you can proceed to the next line. If the checksum doesn't match, there is an error in that line and it should be retyped. The same tricks used in Checksoft can be applied to Checkbin.

Checkbin recognizes the following commands:

ESC	**Stop pausing after every ten lines.**
SPACE	**Re-enable the pause function (this is different from Checksoft) and list the next ten lines.**
ctrl C	**Exit Checkbin.**

Any other key will display the next ten lines.

Using Checkbin with a Printer

If a printout of the checksums and the code is desired, simply turn on the printer before calling Checkbin. To turn on the printer from machine language, type PR#n, where n is the slot that your printer card is in (usually one). Then proceed with the check. When you are done, turn off the printer with PR#0.

Make sure that the printout goes to the screen as well as the printer. Your printer manual will have information on how to do this.

How Checkbin Works

Checkbin works by running every byte in the program being verified through the checksum routine. The checksums are dependent on where in memory that program is located. Checkbin is relocatable. This means that it may be BRUN anywhere in memory without affecting the checksums. If Checkbin was not relocatable it might interfere with the program being checked.

All programs that have a checksum list will also have the beginning and ending addresses of the program, along with the location where Checkbin should be BRUN.

Checkbin can be used to check itself as well as the machine language part of

Checksoft. I have included the checksums for both programs.

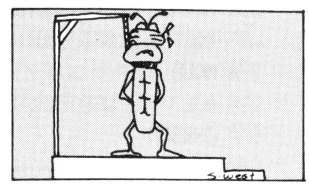
There are no configurations for Checkbin.

Checksums for Checkbin

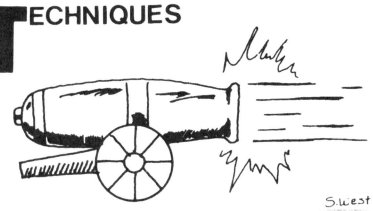
BEG: *300.3CD END:

```
0300- 20 58 FF BA CA BD 00 01   $B2E1
0308- 18 69 1F 8D F9 03 85 62   $286C
0310- E8 BD 00 01 69 00 8D FA   $D2ED
0318- 03 85 63 A9 4C 8D F8 03   $68E2
0320- 60 20 8E FD A9 0A 85 0A   $2066
0328- A0 00 84 31 20 A7 FF A9   $5284
0330- FF 85 31 A5 3C 85 0B A5   $0223
0338- 3D 85 0C 20 A7 FF A0 55   $D448
0340- A9 10 91 62 A9 FB C8 91   $6CDF
0348- 62 A0 00 F0 45 A5 3C 29   $E502

0350- 07 D0 42 38 A9 1F E5 24   $E2B6
0358- AA 20 4A F9 A9 A4 20 ED   $3E81
0360- FD A5 0B A6 0C 20 41 F9   $459D
0368- C6 0A D0 26 20 8E FD A9   $2DD5
0370- 0A 85 0A AD 00 C0 EA EA   $5EB6
0378- 8D 10 C0 C9 83 F0 48 C9   $C54A
0380- A0 F0 BB C9 9B D0 0B A9   $6C5B
0388- EA A0 55 91 62 C8 91 62   $29C6
0390- A0 00 20 92 FD A9 A0 20   $F038
0398- ED FD B1 3C 48 20 DA FD   $E122

03A0- 68 6A 45 0B 2A 45 0C 85   $C531
03A8- 0B 45 0C 6A 85 0C 20 BA   $059B
03B0- FC 90 9A A9 1F E5 24 AA   $C561
03B8- 20 4A F9 A9 A4 20 ED FD   $8DF6
03C0- A5 0B A6 0C 20 41 F9 20   $2A83
03C8- 8E FD 8D 10 C0 60         $C4C6
```

```
2580          BNE XAM       NO, SO SKIP THE REWRITE SECTION.
2590          LDA #$EA      DISABLE PAUSE FUNCTION.
2600          LDY #KEY+3-SETUP
2610          STA (RELOCATE),Y
2620          INY
2630          STA (RELOCATE),Y
2640          LDY #$00
2650 XAM      JSR PRA1      PRINTS A1L,A1H AND A DASH
2660 CHECKSUMS LDA #$A0     PRINTS A SPACE
2670          JSR COUT
2680          LDA (A1L),Y   PRINT THE BYTE
2690          PHA           SAVE THIS VALUE
2700          JSR PRBYTE
2710          PLA           RETRIEVE VALUE
2720          ROR           RUN THROUGH CHECKSUM ROUTINE
2730          EOR CHKSUM
2740          ROL
2750          EOR CHKSUM+1
2760          STA CHKSUM
2770          EOR CHKSUM+1
2780          ROR
2790          STA CHKSUM+1
2800          JSR NXTA1     INCREMENT A1L,A1H AND COMPARE TO A2L,A2H
2810          BCC MOD8CHK   IF CARRY CLEAR THEN A1L,A1H <> A2L,A2H SO CONTINUE
2820          LDA #31
2830          SBC HTAB
2840          TAX
2850          JSR PRINT.X.SPACES
2860          LDA #'$+$80   PRINT FINAL CHECKSUM
2870          JSR COUT
2880          LDA CHKSUM
2890          LDX CHKSUM+1
2900          JSR PRINTAX
2910 DONE     JSR CROUT     EXIT PROGRAM
2920          STA CLEAR
2930          RTS
2940
```



ADVANCED PLAYING TECHNIQUES



Cannonball Blitz A.P.T.

Here is a short A.P.T. for ***Cannonball Blitz,*** which will reduce the hazards encountered on the second level of play.

After finishing Level 1, just press the space bar and the repeat key simultaneously (or press the space bar continuously if you have automatic repeat) until the screen changes to the next level.

When play begins at the second level, the number of cannons will have been reduced to only two.

And a Quick Softkey. . .

To copy the entire disk, use COPYA. Then, using a disk edit program such as *DiskEdit,* read Track 17, Sector 0E, and change address CD from 49 to 60. Finally, write the sector back to the disk.

This back-up copy can be copied using any of the numerous copy programs on the market. To run the program, simply boot the disk.

Cannonball Blitz, Sierra On-Line, Inc., 36575 Mudge Ranch Road, Coarsegold, California 93614.

INPUT

continued from page 2

out dollars ahead if they licensed look-alikes to non-Atari programmers, but I seriously doubt they'll sell much more product as a result.

We as computer consumers are all headed for lean times ahead if we're only to be offered one game program where you have to shoot down space ships dropping bombs on us. Would a programmer be permitted to change the space ships to flying saucers and implement his own version? What if he used lasers instead of missiles, would that be different enough to keep him from getting sued? And who's to decide just how much different is different enough, a judge?!?!?

If this carries over to other types of publishing, just think . . . No more "boy meets girl . . . girl meets girl . . . boy gets girl," sorry, it's been used before. And the western where the new Marshall comes to town to clean it up and can't get help from anyone but the pretty widow . . . Well, you get the idea.

Someone once said, "There are no new ideas, just new combinations of ideas."

Granted, Atari deserves to be rewarded handsomely for creating Pac Man, and they are being so rewarded. But no one copied their source code (at least I don't think it's been alleged) so where have their copyrights been infringed? This is crazy; Atari can stop others from publishing something that merely looks like something of theirs while Apple can't get an injunction to stop the manufacture of computers that are alleged to use an actual copyrighted source code of theirs.

All of this is, of course, just my opinion, and I've already confessed to knowing very little about copyright law, but, in my opinion, if Atari pulls this off, it's bad news for everyone but Atari. We consumers shouldn't be hailing it as Justice.

Warren Michelson
Page, AZ

Hardcore Info Valuable to Business

After driving 160 miles (round trip) to obtain a copy of issue #3, and approximately 140 miles to find issues 1 and 2, I determined that a subscription would

hardcore

While the price of everything else in Appledom is shooting SKY-HIGH, subscription rates for the new CORE and HARDCORE COMPUTIST magazines are HALF the cover price!

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take much less of my time and would be much more enjoyable.

I appreciate and applaud the wealth of information you have packed into each issue. As a businessman, I feel that the information that you are providing will enable myself, and others like me, to make back-up copies of valuable business software. Since I no longer support those software publishers who deprive me of my right to protect my software investment, I welcome every opportunity to protect (legally) my company's existing software library.

Keep up the good work that you have begun and "stick by your guns." I believe you'll see the "other community" slowly beating a path to your door.

William E. Noel
Ontario, CA

Some Tips for Ultima

I have really enjoyed Issue 3 and the last two Updates. Especially the articles on *HyperDOS, Castle Wolfenstein* and *Ultima. Ultima* is the subject of this letter.

Using the I.O.B. program and following the excellent directions given by Bobby I was able to make 16-sector copies of both sides of the *Ultima* disk. Next I tried to make a character disk and then realized that the Player Master would no longer do this since it was originally 13 sectors.

After a little searching I discovered that the program named 'PLAYER DISK' included the copy program to make a player character disk. The changes necessary to make it work with 16-sector DOS 3.3 were minimal and it now works better (faster) than the original.

Just change the following lines to read as shown:

531 FOR A = 768 TO 801: READ B: POKE A,B: NEXT A: RWTS = 768

532 DATA 32, 227, 3, 32, 217, 3, 176, 25, 238, 241, 183, 206, 237, 183, 173, 237, 183

533 DATA 201, 255, 208, 235, 169, 15, 141, 237, 183, 238, 236, 183, 198, 0, 208, 223, 96

590 FOR T = 3 TO 27 STEP 8: GOSUB 640: NEXT T

790 POKE VO, 0: POKE TR, T: POKE SE, 15: POKE BL, 0: POKE BH, 20: POKE CO, C

800 POKE 0, 8: CALL RWTS: IF PEEK (0) = 0 THEN RETURN

Now save this program PLAYER DISK back to the Player Master. That's all it takes to make the Player Master work as intended.

C.V. Fields
Sacramento, CA

Praise from a Magazine Virtuoso

I subscribe to *Popular Computing, Creative Computing, Byte, Softalk, Apple Orchard, In Cider, Computers and Electronics, Softside,* and maybe something else and I've never been impressed enough with one to write and say anything, but yours is different. I've learned more about how my computer works from just one issue of HARDCORE than I have from any of the others.

William Wingfield Jr.
Martinsville, VA

A Lyrical Letter to the Editor:

Not Pirates, But Pioneers?

I'm sick and tired of hearing all
The names that some are calling.
You'd think, for all their bitching, that
The cops would soon be hauling
A bevy of us off to jail!
For breaking copyrights?
Folks oughta take a closer look.
They'd see we set our sights
Much higher than mere pirating.
Indeed, in coming years,
We'll not be known as pirates, but
—COMPUTER PIONEERS!

We hurt the micro industry?
That's rumored in some quarters.
When really, we're the industry's
Most powerful supporters!
For software can't be run without
Some hardware. Obvious?
Then why are all those micro firms
So paranoid of us?
They'd welcome us with open arms,
If only they could see
That what we do, does benefit
Their whole darn industry!

I've never seen an issue of
Your HARDCORE publication.
And yet, I've heard the word of how
You captivate the nation!
A lot of folks are very proud
Of what you're here to do.
Indeed, you are succeeding! And I
Praise the Lord for you!

Michael Herbert Shadick
Minneapolis, MN

(advertisement)

Anyone who has purchased an issue of *Hardcore Computing* or any other product from Norman Napier, "Red Rebel," or Pirates Harbor, either by mail or at a computer fair, please contact Bev R. Haight at 14404 East "D" Street, Tacoma, WA, 98445. You will be of great help in collecting information for a comprehensive article on Pirates Harbor.

HARDWARE REVIEW:

the REPLAY II card

by Robb Canfield

Replay II is an updated version of the original *Replay* card, which was among the first copy cards marketed. It is still being produced by the same company, but the name has been changed from Texas Ranch And Shoreline Systems (TRASH) to Micro Analyst, Inc. (a wise decision).

The revised Replay II is a definite improvement over the first Replay. The card no longer interferes with any other card in the computer and can now copy the entire 64K of memory. The copy switch has been moved from the card to the end of an 18-inch cable extending out from the back of the computer. In addition, the card now makes three different types of copies.

Making a Copy

The first and easiest way to make a copy of the memory is to press the copy button and select "C" from the menu displayed. The card will prompt you to insert a blank diskette, and the program in memory is then copied in about 15 seconds. The quick copy will reload in about 10 seconds. This method provides a fast and convenient way of making a copy. Unfortunately, the copy is written in a non-standard format and requires that the Replay card be in the computer to boot the disk. A RAM card is not necessary.

The second copy method makes a standard DOS file which represents the entire 48K of memory. Its only limitation is that a RAM card is required to boot the disk (the Replay card need not be in the computer). The copy will reload in approximately one minute. To make this kind of copy requires no programming skill, and consists of first making a quick copy (the first one mentioned) and then running "DOSMAKER" from the Replay utility disk to convert the quick copy to standard DOS.

The third type of copy creates a single binary program that will boot under normal DOS. It does not require the Replay card or a RAM card. This kind of copy is called a "packed" copy, and it is made with the use of the packer program on the Replay utility disk. A knowledge of machine language is required to understand and use the packer utilities.

Advanced Topics

The packer and the programs that go along with it make up a powerful set of utilities. Using these utilities, it is possible to analyze and condense the 48K copy into a more compact file that does not require extra hardware to run. Some of the utilities included help scan for used and unused sections of code and eliminate those sections that are unused. This would be the best type of copy if it were not so difficult to understand.

A number of auto-pack utilities are included. These allow the inexperienced user to pack some of the more popular programs wthout having to know a great deal about machine language. There are also utilities that allow the creation of an auto-pack file if you can figure out how to pack the file in the first place.

Functions on the Card

When the copy switch is pushed, a menu appears with a choice to copy the disk, view various screens or enter a special monitor. This monitor is one of the more powerful and useful features of the card. The monitor shows where the reset vector is pointed and what the program counter and stack pointer were when the copy switch was pressed. From the monitor, memory may be displayed as hex or ASCII values (there is no disassembler available). Specific values can be changed and a search for a certain byte may be performed.

The only complaints I have are that there is no way to enter into the normal Apple monitor, and that to look at the original pages (0-7) requires the user to look at the memory on the card itself (a rather hit or miss proposition).

Documentation

The manual makes an effort to explain all the functions of the card, and does well on the first and second copy methods. It falls down on the packer section. The instructions for the packer are hard to understand and the utilities are not at all user-friendly. They require the user to keep referring to a chart that relates logical and physical sectors. This should have been implemented in software, leaving the user free to think about more important matters.

Summary

The Replay card is very easy to use and understand (as long as the packer section is avoided like the plague). The Replay card no longer has any conflicts with other cards or slots and it has more features than Wildcard and Snapshot. Its versatility allows it to be used as a copy card and as a very helpful programming aid (one I have used many times when my program decided to leave this universe). Of all the cards I have used, I have found the Replay II to be the most powerful card available.

a note on Crackshot and Replay

The ***Crackshot*** card sold by Pirate's Harbor is an earlier version of the ***Replay 1.0*** card. This card has conflicts with other cards and slots.

The newer Replay II card is available from Micro Analyst, Inc. at P.O. Box 15003, Austin, Texas, 78761 for $150.00.

The Replay II has no conflicts with other cards or slots and makes three different types of copies.

Purchasers of the Crackshot card may not be able to upgrade to the Replay II as Micro Analyst, Inc., has informed us that Pirate's Harbor is not an authorized dealer.

If you are considering the purchase of a copy card, call Micro Analyst, Inc. directly at (512) 926-4527.

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Hardware Copy Cards

The war goes on. The scenario is similar to the electronic warfare situation. First there were protected programs on cassette. Those were broken. Then came protected diskettes and the nibble copiers. Then more sophisticated protection mechanisms were introduced and more sophisticated copy programs became available. Now we have the hardware copy cards. Each of the three cards reviewed is designed to make copies of the program in memory, for archival purposes. All of these hardware copy methods are subject to similar restrictions. They only easily copy programs which reside entirely in memory; programs requiring multiple disk accesses (except possibly for user data files) will most likely remain uncracked. At present these copy cards will not satisfy all of your archival needs. Total satisfaction can only be achieved by unlocked software, or software which allows a limited number of back-ups to be made. But for single load programs, perhaps one of these cards will be satisfactory. None of the cards is really intended to copy programs running with a Z-80 card.□

CRACK-SHOT

PIRATES HARBOR
P. O. Box 8928
Boston, MA 02114
617-738-5051 (modem)

$149.95
Machine language
48K, DOS 3.3

Unlocked

Reviewed by Edward Burlbaw

INTRODUCTION

CRACK-SHOT can be installed in any slot, provided there is no card in slot 0. If you have a RAM card, you will have to remove it. In order to run copied programs, CRACK-SHOT must be installed in one of the slots (slot 0 can be occupied) or a RAM card can be used. There are known conflicts with certain other cards, such as the Hayes Micromodem II and some video cards. I also had problems using my Grappler card with CRACK-SHOT installed, and vice versa. Any conflciting cards must be removed before using CRACK-SHOT. A good rule would be to take everything out, except CRACK-SHOT and the disk controller card.

MAKING A COPY

This is a very simple procedure. Once the card is installed, any program can be run as normal. When the program is at the desired point, the CRACK-SHOT copy switch is flipped and a blank diskette placed in drive one. A copy will be made in fifteen seconds. The blank diskette then has a copy of the entire 48K of memory, with the exception of the screen display locations. These must be set, on booting, by a menu within the CRACK-SHOT program. To execute your copy with the CRACK-SHOT card in place, simply CALL a location on the card and it takes over from there. You have essentially created an archival copy of the program which requires a hardware "key" (CRACK-SHOT) to run. If you are satisfied, there is nothing more to do. File the original away and use the CRACK-SHOT copy.

ADVANCED TOPICS

If you are satisfied with the copy described in the previous paragraph, you will not be interested in the other possibilities of CRACK-SHOT. There are other utilities included on the system disk for analysis of the copy. The EDIT utility will allow you to read tracks into a buffer, disassemble the code in the buffer, write the buffer back to disk, or exit to BASIC (for BSAVE operations). The PACKER utility is perhaps the most powerful of the utilities. For example, if it can be determined that the entire 48K is not being used by the program, the program areas of memory can be consolidated and automatically unfolded once resident in memory. This would allow loading under DOS 3.3 without the CRACK-SHOT card. I would feel more comfortable with an archive copy of this nature. The PACKER utility is also the most difficult to understand. It is confusing because it requires one to keep track of physical and logical locations of the code and the location on the diskette. Other features of PACKER will read and attempt to analyze the various sections of the copied memory to locate code or ASCII data sections. This can be done manually or automatically. Packing command files can also be created but, obviously, you have to be able to first do it manually.

The language card is supported in several ways. The utility programs will run with the card and use the extra memory to increase the size of the binary file that is packable. The language card can be used in place of the CRACK-SHOT card, for running the copy.

DOCUMENTATION

The manual is very extensive and attempts to explain all of the features and possibilities of CRACK-SHOT. The simple copy and rerun procedures are well covered, but the advanced topics are not adequately treated. Perhaps the experienced user will not need any more explanation, but a simple tutorial would improve the usability considerably. There are nine Appendixes with some examples, tips, trouble shooting hints, and packing parameters (sound familiar?).

SUMMARY

In addition to making archival copies of single-load protected programs, CRACK-SHOT can be used as a gaming tool by making copies which start at higher levels. Once understood, the extensive advanced features could be useful. If you dislike performing surgery on your Apple, you may be annoyed with the slot 0 restrictions and the conflict with other cards.□

SNAPSHOT

Dark Star Systems
54, Robin Hood Way
Greenford, Mddx. UB6 7QN
01-900-0104

P. O. Box 140
Amherst, MA 01004
413-584-7600

$109.95 (plus p&h)
Machine language
Dos 3.3, 64K (certain RAM cards only)

Unlocked

Reviewed by Edward Burlbaw

INSTALLATION

SNAPSHOT can be used with only some RAM cards. The more common of these are Apple, Microsoft, and Ramex. Also supported

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Las Cruces, NM 88004-0188, (505) 526-8364

are Digitek, MPC, RH Electronics, and Super Ram II. It also works with the Franklin Ace 100, with 16K card, and the Ace 1000. The list is growing, so if you have any questions concerning the suitability of your RAM card, check it out with Dark Star Systems. Known exceptions are Andromeda, Indigo, and Saturn 32K. You must remove one of the chips from your RAM card and plug the ribbon cable connector, from the SNAPSHOT board, into the empty socket. The SNAPSHOT card can then be inserted into any of the nearby slots on the motherboard. There is an empty socket on the card into which to plug the game paddles or a four-switch dip switch. Either of these will be used to activate the copy program when it is time.

MAKING A COPY

Either the game paddle or one of the switches can be used to activate the SNAPSHOT card. If it is not active, the RAM card acts as if SNAPSHOT were not present. This enables the RAM card to be used normally. The SNAPSHOT software is booted into the RAM card. Pushing the paddle switch, or the appropriate dip switch, will activate SNAPSHOT and display its menu. The "subject" diskette can then be booted. (Thirteen-sector diskettes can be used with the BASICS diskette.) Once the subject is in memory, pushing the button again interrupts the program and displays the SNAPSHOT menu. The menu has several options in a logical order. If you proceed from the top to the bottom, you will be doing the steps necessary to create a working backup. The video display settings are selected, both for bootup and run. The memory is then saved on disk. The final step is to use the last option of converting SNAPSHOT disk to a backup disk that does not require the software to be in the RAM card. The backup will now run on any 64K Apple (independent of the type of memory card). It may or may not run on a 48K Apple. By activating the SNAPSHOT card, and disabling the RAM card, the copy can be checked on a 48K machine.

One of the menu options allows the user to exit to the monitor for disassembly of the program in memory or other diagnosis. Some memory is available on the RAM card for user programs to assist in this. An exit to BASIC is also allowed which may make the program in memory LISTable. There is very little treatment of advanced techniques, but I submit that once the DOS 3.3 backup is created, very little more is needed.

DOCUMENTATION

The instruction booklet consists of 13 typewritten half-pages. Everything necessary to make a DOS 3.3 backup of a memory resident program is found in it. It's not fancy, but definitely adequate.

SUMMARY

SNAPSHOT can be used in a manner similar to CRACKSHOT for creating high level starting games or archival copies of single load programs. The necessity to use one of the compatible RAM cards will be a problem, unless you happen to have one of them. The simplicity of the menu-driven software is very convenient to use.□

WILDCARD

East Side Software Co.
344 E. 63 St., Suite 14-A
New York City, NY 10021
212-355-2860

$129.95 ($3 s&h)
Machine language
Dos 3.3, 64K, Apple II+

Unlocked

Reviewed by Edward Burlbaw

INSTALLATION

With power off, open the Apple cover and place WILDCARD in any empty slot with the cable exiting through one of the slots in the case. Close the cover and turn the power back on. The only requirement is that you have a RAM card and an empty slot.

MAKING A COPY

Load the subject program. When it is at the selected point, press the WILDCARD button and RETURN. The WILDCARD menu will appear and allow you to boot, restart, or exit to monitor. To make a copy, use the boot option with the WILDCARD system disk in drive 1. From there follow the menus to create a turnkey autoboot copy of the subject software. You will need a blank diskette and it will take about two minutes to complete the copy. You then have an archive copy which will boot on a 64K machine. It may be possible to compress it to run on a 48K machine. The compression can be attempted automatically by selecting the appropriate option. If this is unsuccessful, it will still run on a 64K machine. As with the other copy cards, the video screen to be displayed must be selected during the copy process.

DOCUMENTATION

The thirty half-sized pages contain installation and operation procedures. The copy section leads you through a sample copy procedure. It is simple enough that once or twice through the book will be sufficient. A process is described by which a 64K program may be copied; however, if it cannot be compressed sufficiently it will not be successful. There is a short section discussing some uses of the utility option for the machine language programmer.

SUMMARY

WILDCARD like SNAPSHOT and CRACK-SHOT provides a convenient method for backing up single load programs. It requires the least modification of, and places the fewest restrictions on, the existing hardware. It is both simple and easy to use.□

The three cards reviewed above are all designed to provide a method of creating archive copies of legitimately acquired software. Each uses a slightly different approach to achieve essentially the same end. CRACK-SHOT requires that any card in slot 0 be removed before operation and other interface cards can interfere with its operation. These include some fairly common cards (i.e., D.C. Hayes and Grappler) and, if in place, would interfere with the operation. There are more advanced features supported, but an understanding of some of them is required to create a DOS 3.3 backup. SNAPSHOT places fewer restrictions on existing hardware. Used with one of the supported RAM cards, there are no restrictions, but a chip must be removed from the card. That could be viewed as a disadvantage. The copy procedure is perhaps the easiest and clearest of the three cards. WILDCARD places the least restrictions on the hardware. In purchasing, this could be the deciding factor. The copy procedure is clear and straightforward.

Overall, with one of the supported RAM cards, SNAPSHOT, at $109.95 is the best buy. WILDCARD places next because of ease of use. CRACKSHOT is the most expensive of the three, has memory conflicts with other cards, and requires the most technical knowledge to use. However, it also has more features available to the advanced user.□

CHECKSUMS FOR

QD.Editor

Configuration 1

```
10   - $BADD
20   - $32F3
30   - $0CCE
40   - $7F9A
50   - $601F
60   - $3A19
70   - $0796
80   - $56C8
90   - $82DE
100  - $D39A
110  - $FD44
120  - $EE94
130  - $06CD
140  - $4B03
150  - $9693
160  - $7864
170  - $2E88
180  - $75E2
190  - $889F
200  - $CF16

210  - $CCCB
220  - $504B
230  - $3638
240  - $DF71
250  - $3886
260  - $4F24
270  - $616A
280  - $1AD5
290  - $AC8E
300  - $F901
310  - $E122
320  - $F362
330  - $746B
340  - $73AF
350  - $382A
360  - $F0B5
370  - $6FD8
380  - $9F80
390  - $71EB
400  - $92F9

410  - $6F71
420  - $527E
430  - $A403
440  - $8BAF
450  - $FBC0
460  - $4BB5
470  - $8BA2
480  - $EE40
490  - $20AB
500  - $1DBA
510  - $70E9
520  - $9D78
530  - $F7BA
540  - $0AB4
550  - $7BC6
560  - $F563
570  - $67CB
580  - $5B8D
590  - $E2D7
600  - $573D

610  - $9080
620  - $8B3D
630  - $2BF0
640  - $27BE
650  - $80E7
660  - $9003
670  - $7A9B
680  - $94EC
690  - $7F70
700  - $CE91
710  - $381B
720  - $E504
730  - $D35D
740  - $15E4
750  - $D3F9
760  - $B4E6
770  - $9D20
780  - $CD6D
790  - $73FC
800  - $4E92

810  - $6DF1
820  - $A5D1
830  - $DCBC
840  - $5131
850  - $3A50
860  - $2FE6
870  - $4087
880  - $488C
890  - $22AE
900  - $2680
910  - $E421
920  - $968F
930  - $82BB
940  - $852B
950  - $C22A
960  - $FCF3
970  - $42C1
980  - $5CAF
990  - $110E
1000 - $E04A

1010 - $991A
1020 - $D303
1030 - $8159
1040 - $676F
1050 - $BDCA
1060 - $FC37
1070 - $0DF5
1080 - $EE6F
1090 - $9B14
1100 - $33FF
1110 - $44AE
1120 - $30F6
1130 - $F1BB
1140 - $1C26
1150 - $51A5
1160 - $D402
1170 - $C17D
1180 - $346E
1190 - $F585
1200 - $41CE

1210 - $604A
1220 - $CA43
1230 - $9BD4
1240 - $845E
1250 - $2913
1260 - $1FD8
1270 - $22D8
1280 - $12C6
1290 - $88C2
1300 - $6002
1310 - $7D4A
1320 - $9085
1330 - $189E
1340 - $6CFE
1350 - $84AE
1360 - $CC9C
1370 - $737B
1380 - $30ED
1390 - $DB1D
1400 - $E42B

1410 - $15BB
1420 - $F227
1430 - $C9CF
1440 - $151B
1450 - $CDAA
1460 - $3EB2
1470 - $C85D
1480 - $8A5B
1490 - $9505
1500 - $869F
1510 - $F1C3
1520 - $702A
1530 - $50B1
1540 - $7763
1550 - $057D
1560 - $7C08
1570 - $7C14
1580 - $8732
1590 - $3062
1600 - $543F

1610 - $F614
1620 - $3E31
1630 - $77A8
1640 - $ADC0
1650 - $BF1A
1660 - $DF12
1670 - $70B1
1680 - $7751
1690 - $70AF
1700 - $5E45
1710 - $3E74
1720 - $342C
1730 - $FA36
1740 - $B35F
1750 - $5ED9
1760 - $D331
1770 - $0F47
1780 - $D76A
1790 - $7EF1
1800 - $3B15

1810 - $BA9F
1820 - $78C0
1830 - $F425
1840 - $6EC8
1850 - $C5E7
1860 - $FE39
1870 - $D290
1880 - $646A
1890 - $8C06
1900 - $B37C
1910 - $375C
1920 - $0DD2
1930 - $2767
1940 - $9A1D
1950 - $1C04
1960 - $2EDD
1970 - $1527
1980 - $7965
1990 - $D80F
2000 - $0CB0

2010 - $A8D1
2020 - $9023
2030 - $31CA
2040 - $EB38
2050 - $3736
2060 - $E5DA
2070 - $3F2C
2080 - $CCD3
2090 - $D1ED
2100 - $3A3A
2110 - $7082
2120 - $AB3A
2130 - $7EE4
2140 - $8B66
2150 - $E01F
2160 - $3156
2170 - $D34F
2180 - $5D9A
2190 - $3469
2200 - $A39F

2210 - $8DB0
2220 - $6372
2230 - $85A6
2240 - $198C
2250 - $56D0
2260 - $59AB
2270 - $AE38
2280 - $641E
2290 - $2153
2300 - $01D9
2310 - $BDC5
2320 - $B2D3
2330 - $5847
2340 - $6243
2350 - $30D3
2360 - $5BEA
2370 - $E7F5
2380 - $BD62
2390 - $DD57
2400 - $716B

2410 - $4352
2420 - $E585
2430 - $4D6A
2440 - $EEF4
2450 - $023A
2460 - $FF47
2470 - $FEB1
2480 - $937D
2490 - $4765
2500 - $7910
2510 - $DBC6
2520 - $DE5F
2530 - $E122
2540 - $27A5
2550 - $10E8
2560 - $BF06
2570 - $B0B6
2580 - $ABE1
2590 - $5EAE
2600 - $E5ED

2610 - $2776
2620 - $C5E2
2630 - $3E51
2640 - $063F
2650 - $4449
2660 - $7D6E
2670 - $256D
2680 - $6F51
2690 - $DA83
2700 - $D166
2710 - $3EA5
2720 - $CA9B
2730 - $9B30
2740 - $5A16
2750 - $2B12
2760 - $7369
2770 - $FEB2
2780 - $774B
2790 - $A8F6
2800 - $CC32

2810 - $156A
2820 - $F597
2830 - $42F3
2840 - $8111
2850 - $03BF
2860 - $496C
2870 - $ED10
2880 - $6DBF
2890 - $78C1
2900 - $3284
2910 - $6A0F
2920 - $1443
2930 - $766E
2940 - $8D32
2950 - $BD26
2960 - $6900
2970 - $3CFE
2980 - $A8DB
2990 - $DFB9
3000 - $6569

3010 - $C96E
3020 - $EB74
3030 - $60D6
3040 - $DEF4
3050 - $0B2D
3060 - $0284
3070 - $6048
3080 - $5120
3090 - $CC76
3100 - $1380
3110 - $2F54
3120 - $67A7
3130 - $9155
3140 - $652E
3150 - $C736
3160 - $197F
3170 - $A52A
3180 - $DFBA
3190 - $8E4B
3200 - $6D86

3210 - $A916
3220 - $700B
3230 - $3BAA
3240 - $EB5A
3250 - $AD29
3260 - $8E10
3270 - $4FB6
3280 - $F983
3290 - $8317
3300 - $468A
3310 - $7253
3320 - $C7C2
3330 - $3A3B
3340 - $9FBB
3350 - $5AE7
3360 - $3187
3370 - $0352
3380 - $CE90
3390 - $6CC7
3400 - $3BBF

3410 - $7E71
3420 - $E6AE
3430 - $D138
3440 - $4ADE
3450 - $4844
3460 - $A9FF
3470 - $0125
3480 - $7466
3490 - $B6FA
3500 - $BD40
3510 - $DE2A
3520 - $DCC6
3530 - $B805
3540 - $2F44
```

QUICK DRAW

Editor.Set

BEG: D00.DFF END:

```
0D00- 7F 7F 7F 7F 7F 7F 7F 7F  $00AD
0D08- 7F 01 01 01 01 71 11 11  $9F15
0D10- 7F 00 00 00 00 7F 00 00  $5D95
0D18- 7F 40 40 40 40 47 44 44  $F1DF
0D20- 44 44 44 44 44 44 44 44  $51BF
0D28- 44 44 47 40 40 40 40 7F  $CDC1
0D30- 00 00 7F 00 00 00 00 7F  $8FA5
0D38- 11 11 71 01 01 01 01 7F  $999A
0D40- 11 11 11 11 11 11 11 11  $6112
0D48- 00 66 66 00 00 66 66 00  $156E

0D50- 00 4C 4C 00 00 4C 4C 00  $4D36
0D58- 00 19 19 00 00 19 19 00  $3912
0D60- 00 33 33 00 00 33 33 00  $6192
0D68- 7F 41 41 41 41 41 41 7F  $C845
0D70- 00 00 08 1C 08 00 00 00  $042B
0D78- 0F 69 69 0F 0F 69 69 0F  $20F7
0D80- 1E 52 52 1E 1E 52 52 1E  $0027

0D88- 3C 25 25 3C 3C 25 25 3C  $B463
0D90- 78 4B 4B 78 78 4B 4B 78  $5C53
0D98- 70 16 16 70 70 16 16 70  $783F

0DA0- 61 2D 2D 61 61 2D 2D 61  $585F
0DA8- 43 5A 5A 43 43 5A 5A 43  $ECAB
0DB0- 07 34 34 07 07 34 34 07  $042B
0DB8- 7F 7F 00 00 7F 7F 00 00  $5C9B
0DC0- 7F 7F 00 00 7F 7F 00 00  $842B
0DC8- 7F 7F 00 00 7F 7F 00 00  $DC9B
0DD0- 7F 7F 00 00 7F 7F 00 00  $042B
0DD8- 7F 7F 00 00 7F 7F 00 00  $5C9B
0DE0- FF FF 00 00 FF FF 00 00  $842B
0DE8- FF FF 00 00 FF FF 00 00  $DC9B

0DF0- FF FF 00 00 FF FF 00 00  $042B
0DF8- FF FF 00 00 FF FF 00 00  $5C9B
```

QD.Editor.Util.Obj

BEG: 300.3A9 END:

```
0300- 02 00 06 00 0E 00 23 2D  $3318
0308- 35 36 3F 27 04 00 35 27  $DAB8
0310- 00 A4 0B A9 00 99 FF 17  $03B3
0318- 88 D0 FA 60 A4 0B B9 FF  $3CC4
0320- 17 91 1A 88 D0 F8 60 A4  $3FEF
0328- 0B B1 1A 99 FF 17 88 D0  $7942
0330- F8 60 A9 0E 8D 3F 03 A9  $A007
0338- 00 A2 08 A0 00 8D 00 0E  $F775
0340- 88 D0 FA CA F0 05 EE 3F  $DDCF
0348- 03 10 F0 60 A4 0B B9 00  $BD1C

0350- 18 A6 19 F0 04 09 80 30  $00F4

0358- 02 29 7F 99 00 18 C8 C4  $70EB
0360- 0C D0 EB 60 A4 0B B9 00  $08E6
0368- 18 49 7F 99 00 18 C8 C4  $65E9
0370- 0C D0 F3 60 A4 0B B9 00  $C15C
0378- 18 30 04 09 80 30 02 29  $CEF2
0380- 7F 99 00 18 C8 C4 0C D0  $827F
0388- ED 60 E8 A9 00 9D 04 70  $B242
0390- 60 A6 FB E0 0B F0 08 B0  $A05B
0398- 03 4C A2 03 0A 0A 0A 0A  $B595

03A0- 0A 0A 45 FC 85 FC 60 02  $4C15
03A8- 00 06                    $D00E
```

Make Tables

Configuration 1

```
10  - $BADD   110 - $71CE   210 - $EB59   260 - $8ADA   310 - $F9B4
20  - $81CA   120 - $09AE   220 - $9C92   270 - $0376   320 - $B0D1
30  - $1920   130 - $1B7C   230 - $9660   280 - $2DD2   330 - $BD23
40  - $5F32   140 - $B8C3   240 - $D3F2   290 - $CD1D   340 - $A705
50  - $44AB   150 - $C555   250 - $6927   300 - $D98C   350 - $DAE7
60  - $F740   160 - $8887
70  - $947A   170 - $7665
80  - $24E0   180 - $2E03
90  - $51B6   190 - $DF85
100 - $6247   200 - $CB1C
```

Due to space limitations, the checksums for Design Plus, UFO Factory, Space Raid, and Scruncher will be in HARDCORE #2. The checksums for Faster Shapes are on the following page.

Quick Draw. Obj

BEG: 803.8AB END:

```
0803- 85 D2 86 D1 84           $1409
0808- D0 A6 06 86 08 A6 07 BC  $D405
0810- 8C 08 84 00 C9 8D F0 5F  $1E33
0818- 25 32 A8 84 01 18 B9 A4  $7EC8
0820- 08 65 04 8D 4B 08 B9 A4  $33AB
0828- 09 65 05 8D 4C 08 A6 25  $CB4D
0830- BC 8C 08 84 D3 A2 00 C0  $9821
0838- C0 B0 16 B9 A4 0A 85 D4  $2055
0840- B9 64 0B 18 65 E6 85 D5  $C400
0848- A4 24 BD FF FF 91 D4 91  $0CAB

0850- D4 E6 D3 A4 D3 E8 E4 00  $B688
0858- D0 DD C6 08 F0 11 A4 24  $978A
0860- C8 C4 21 F0 12 84 24 18  $2EEF
0868- A5 07 65 01 4C 1A 08 E6  $8C14
0870- 24 A4 24 C4 21 90 0E A0  $6BBB
0878- 00 84 24 E6 25 A4 25 C4  $D18A
0880- 23 90 02 C6 25 A5 01 A6  $F411
0888- D1 A4 D0 60              $944A
```

Get.Obj

BEG: 1700.17A2 END:

```
1700- A4 0B A6 00 86 FE B9 00  $A974
1708- 18 08 29 7F A6 FD E0 08  $2A8E
1710- B0 0D CA 4A CA 10 FC A6  $DD0E
1718- FE 86 00 A2 01 D0 02 A2  $EF46
1720- 07 20 99 17 4A 85 08 B0  $3145
1728- 11 A2 00 20 8D 17 A0 03  $3164
1730- A2 06 A9 00 20 01 F6 4C  $58B8
1738- 4F 17 A2 03 20 8D 17 A0  $C8B4
1740- 03 A2 06 A9 00 20 01 F6  $A324
1748- 28 08 30 03 A2 00 2C A2  $4178

1750- 03 20 8D 17 A0 03 A2 0E  $215D
1758- A9 00 20 01 F6 20 9E 17  $A329
1760- 18 A5 00 69 04 85 00 A5  $290F
1768- 08 CA D0 B5 28 18 A5 01  $C9B9
1770- 69 04 C5 02 90 0C F0 0A  $E535
1778- A6 03 86 01 C8 C4 0C D0  $CB16
1780- 85 60 85 01 38 A5 00 E9  $DC42
1788- 1C 85 00 D0 EF 20 EC F6  $F810
1790- A5 01 A0 00 A6 00 4C 11  $8B1F
1798- F4 86 09 84 0A 60 A6 09  $D491

17A0- A4 0A 60                 $1486
```

Make Start

Configuration 1

```
10  - $9F4F   70  - $47D5   130 - $D210
20  - $6BD2   80  - $DF35   140 - $9AF9
30  - $5C5A   90  - $E4AC   150 - $5DD0
40  - $F1A0   100 - $51C4   160 - $309A
50  - $0E02   110 - $5846   170 - $B5EC
60  - $19F8   120 - $0757   180 - $D9C1
```

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Gary Brown 16,17
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MORE

CHECKSUMS

Faster Shapes

Configuration 1

```
10   - $105F   430  - $6599   580  - $80AF   720  - $A468
20   - $EE1B   440  - $260F   590  - $9C04   730  - $BA30
30   - $5C2B   450  - $58B6   600 - $32CF   740  - $5698
40   - $7E49   460  - $0956                 750  - $3A29
50   - $72F8   470  - $4CB5   610  - $41E4   760  - $3560
60   - $091B   480  - $0891   620  - $9993   770  - $6A4A
70   - $3344   490  - $8D73   630  - $B201   780  - $214A
80   - $611C   500 - $9287    640  - $22E3   790  - $B2AD
90   - $BE9D   510  - $0DEF   650  - $12ED   800 - $FE34
100 - $FFAE    520  - $43F3   660  - $5CCB
110  - $8475   530  - $FA9D   670  - $2706   810  - $9EA9
120  - $D36B   540  - $4038   680  - $3168   820  - $9F0A
130  - $FAB5   550  - $0B7F   690  - $D208   830  - $99C5
140  - $556B   560  - $4F51   700 - $9A4C   840  - $8C19
150  - $4CE0   570  - $786A   710  - $31C7   850  - $E0D9
160  - $FA51
170  - $F467
180  - $4AA3
190  - $0908
200 - $891E

210  - $10D5
220  - $41E5
230  - $4DC1
240  - $FE46
250  - $26F7
260  - $67DF
270  - $91F0
280  - $0004
290  - $92E3
300 - $3D65
310  - $543E
320  - $A730
330  - $5032
340  - $BFBC
350  - $6308
360  - $BE15
370  - $CD22
380  - $DABD
390  - $EBCA
400 - $CC64

410  - $9107
420  - $4436
```

A.L.Shapes

300.3BA

```
0300- A9 00 85 FD 85 FE 85 FC  $D370
0308- A9 0A 85 FB A6 FD BD 00  $4695
0310- 60 C9 FF F0 70 C9 00 F0  $57DE
0318- 28 C9 04 B0 18 20 91 03  $E564
0320- E0 0C D0 0B A6 FE 9D 04  $755F
0328- 70 A0 00 84 FC E6 FE 20  $C474
0330- 67 03 4C 0C 03 A6 FB E0  $F2FD
0338- 0C D0 0E 20 76 03 4C 0C  $7BAE
0340- 03 A6 FB E0 0B F0 08 B0  $5826
0348- 2D 20 64 03 4C 0C 03 A6  $44C0

0350- FD E8 BD 00 60 C9 04 B0  $E9E6
0358- 1D 4C 49 03 A5 FC A6 FE  $851B
0360- 9D 04 70 60 20 91 03 E6  $9702
0368- FD E6 FB A6 FB E0 0D D0  $2DA8
0370- 04 A2 0A 86 FB 60 20 5C  $B16F
0378- 03 A9 00 85 FC E6 FE 20  $6DFB
0380- 71 03 4C 0C 03 20 5C 03  $96DB
0388- F0 06 E8 A9 00 9D 04 70  $8834
0390- 60 A6 FB E0 0B F0 08 B0  $BACD
0398- 03 4C A2 03 0A 0A 0A 0A  $8FE3

03A0- 0A 0A 45 FC 85 FC 60 02  $5683
03A8- 00 06 00 0C 00 3C 0C 15  $819E
03B0- D6 36 00 3C 0C 15 D6 17  $4DDE
03B8- 0D 05 00                 $73DC
```

Copy II Plus Parms

continued from page 9

```
  3. . . . . .3B=1, A=1, 4B=1,
                4D=8, 50=1
                (ERROR 6 OK)

SPACE EGGS * (SRS)
  0. . . . . .9=0
  2-6
  11-1A

SPACE INVADERS * (UNK)
  0-22. . . . . .10=96

SPACE VIKINGS * (SL)
  0-22

STARBLASTER * (PDS)
  0. . . . . .10=96, 9=0
  7-20 BY 1.5. . . .E=DF, F=AD, 10=DE

STARBLAZER (BS)
  Same as Choplifter

THRESHOLD (SOL)
  0-22
  1-23 BY 22. . . . .3B=1, A=1, 4B=1,
                4D=8, 50=1
                (ERROR 6 OK)

TUBE WAY * (DM)
  0-22

TYPING TUTOR * (MIS)
  Use Copy Disk from Main Menu

WORD HANDLER * (SVS)
  Use Copy Disk from Main Menu

VERSAFORM * (AST)
  0-22

VISICALC (VCP)
  0-16

VISICALC /// (AC)
  0-22. . . . . .10=96, 24=96, D=1
NOTE: Don't use bit copy on Visidex,
  Visischedule, Visiterm, or
  Visitrend/Visiplot (VCP).
  Use "Copy Disk" from Main Menu.

VISIFILE (VCP)
  0-22. . . . . .10=96, 34=1, 36=2A,
                37=EB, 3E=2
```

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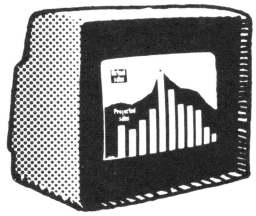

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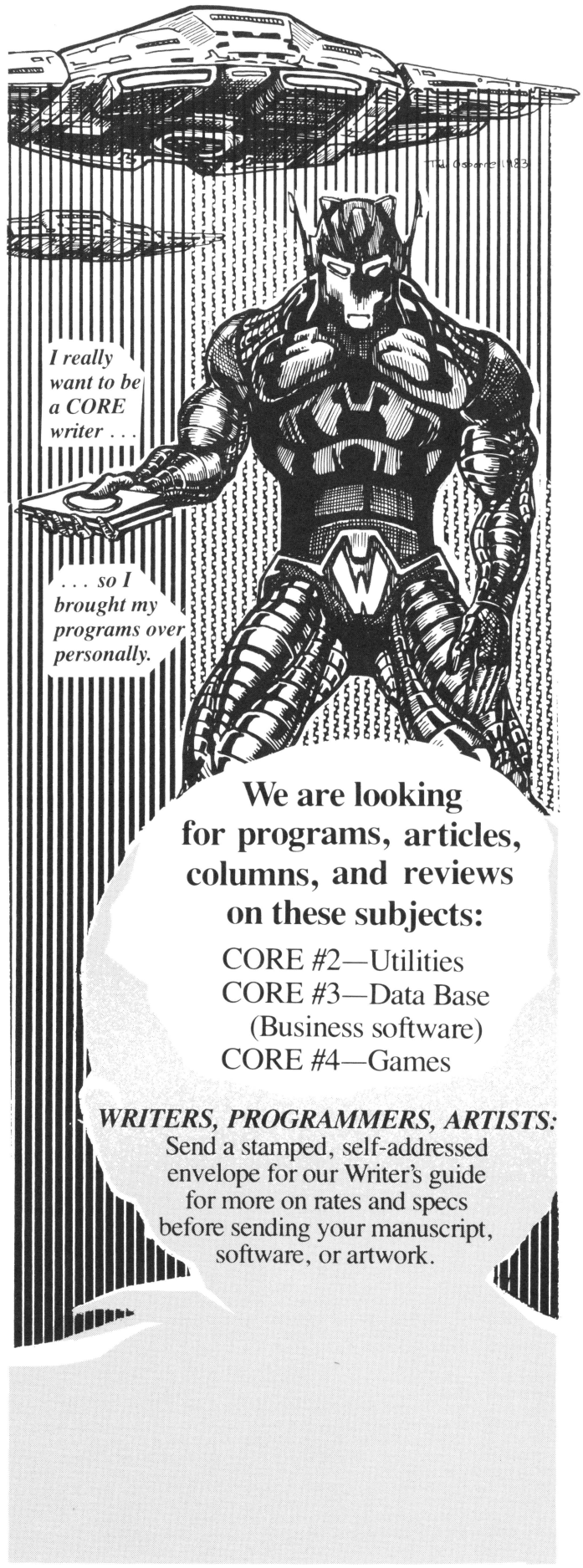

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